LOADING THE DICE

PERSPECTIVES ON CLIMATE CHANGE COMMUNICATION IN AUSTRALIA 1987–2001

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DECLARATION

This thesis contains no material without acknowledgement that has been accepted for the award of any degree or diploma in any university. To the best of my knowledge and belief it contains no material previously published or written by another person, except where reference is made in the text. Some of my original material has been previously published in professional journals as single-author articles.

Maria Taylor

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On reflection, I may not have embarked on a late-career PhD without the early life influence of my father, Ferenc Ribeny, who, by his example, taught me to love exploring knowledge and to appreciate life-long learning. The best part of the PhD process was undoubtedly the pleasure of inductive research and cross-disciplinary insights.

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ABSTRACT

> *For almost 40 years I had the naïve view that if we simply obtain more physical understanding of the issue, we could provide "the" answers and responses would be rational. I now see that there is absolutely no guarantee of this. It is ourselves we do not understand.*
> Atmospheric scientist Graeme Pearman, personal communication, February 17, 2009

The broad theme of this "science and society" study is the communication of anthropogenic climate change over the period 1987–2001 in Australia. Adding a novel science communication analysis to existing studies of policy and media presented the opportunity to broaden understanding of how this society engaged with a unique environmental issue. Relying on the public documentary record, supported by interviews, the investigation found and analysed dramatic changes to communication in correlation with changing public policy and evidence of public knowledge during the course of the study period. Against expectation, the changes went from a high level of early good understanding of climate change risk and response to a high level of confusion and conflict by the end of the study period, while the basic science messages remained consistent throughout. A framing lens was developed to study public language in the documentary record. Major social and cultural influences on the framing were identified and analysed, combining insights from other research fields with original evidence from the thesis research. This study thereby contributes some new insights for communication of environmental science, specifically climate change. It also offers a novel case study in Australian science history.

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CHAPTER ONE
INTRODUCTION

One of the most fascinating and challenging areas of communication is the way we construct our own history—our cultural narrative and beliefs can shift in as little as 10 to 20 years and the shift may not be evidence-based, as I demonstrate in this study. Without reviewing the historical context, we come to think it was always thus.

A literature review spanning areas of the sciences and humanities offers many perspectives on this topic. Social scientists have explored how social reality is constructed within a civilisation (e.g., Diamond, 2005; McKnight, 2005a). Historians and philosophers tell us that social reality has shifted over time within our own civilisation and can be dramatically different from the world views of earlier civilisations. Psychology tells us that knowledge is a social construct. Cognitive linguistics explores how frames and rhetoric are "heard" and constructed.

Moreover, research also suggests the frames and agendas that set societies' constructions of reality are communicated by opinion leaders who, together with the mass media, set the daily narrative agenda (Lakoff, 2004; Rampton & Stauber, 2002; Ward, 1995; Wheelwright & Buckley, 1987). Understanding the deployment of frames and narratives is a key to understanding how science information is constructed in the larger society. Understandings from science and the humanities have been applied to the present longitudinal study, offering a novel communication perspective to the Australian research literature on climate change policy and politics during the study period.

The study blends previously-published research findings with original research, based on the documentary record, to arrive at a review of how anthropogenic climate change (hereafter also called climate change) was communicated over the period 1987–2001 in Australia. An unexpected discovery early in the thesis exploration was considerable evidence for a substantial amount of good public knowledge of climate change in Australia from 1987 to 1992. During this early study period, communication of the science domestically and globally—largely by scientists as the primary source for media and government—had persuaded state and federal policy-makers and media of the need to take action, documented by Henderson-Sellers, 1990, Lowe, 1989 and other authors.

This activity culminated in an early national emissions reduction target—aiming for 20% below 1990 emissions levels by 2005. That early good public understanding and will to act is very significant because it highlights the 20 years of action foregone since that time. These findings and what followed will be discussed in detail in this thesis.

The thesis analyses how the communication framing by opinion leaders of the "dominant narrative" about the greenhouse effect/climate change, its links to fossil fuel consumption, and the possible national responses, changed dramatically during the 1990s, away from the narrative of the early study period. Yet during the whole study period, the science information about causes, effects, and risks changed remarkably little (IPCC, 1990, 1995, 2001). This continued to be the case beyond the study period to the recent timeframe (IPCC, 2007). The main changes to Intergovernmental Panel on Climate Change (IPCC) assessments over the study period, involved greater localised detail and the realisation that the planet is experiencing a level of rapid climate change, greater than previously expected. While the data remained consistent, communication approaches within IPCC reports varied over the years. These approaches are also explored, along with their likely contributing influence on public understanding.

The central research question became: after 1991, how and why was existing public knowledge gradually deconstructed and reconstructed differently? The evidence shows there were very significant changes of the public discourse during the 1990s so that after 1996, with basically the same science data laid out in the first IPCC report in 1990, risk messages and global responsibility messages were being reframed into a hazy "scientific debate", particularly about human agency, that confused the public and helped those who blocked action. The science story became a political story and the dominant narrative became a familiar contemporary one: Australia as exceptional amongst countries, thanks to policy decisions to focus the national economy on mineral and coal exports, and "cheap" electricity production for the domestic market, and to attract energy-intensive multinational industries like aluminium. The communication frames on response options turned from a global ethical approach to an inward-focused "national interest" argument for no change from "business as usual".

To further answer the question of why this radical shift in the dominant narrative happened, consistent with cognitive science understandings about constructing social reality outlined in the methods chapter, I explore not only the sequence of events and

changed communication frames but also some major influences on those events and communications: the values and beliefs of that period, and the media–politics interface in setting the dominant agenda. A third major focus is the role of scientists—through disciplinary differences and the framing of certainty or uncertainty.

Why This Topic?

The research interest in this topic stemmed from my experience as a journalist and, in the first instance, from reports of political interference in the arena of science communication about climate change. The Union of Concerned Scientists (UCS) in the US (http://www.ucsusa.org/global_warming/) has extensively documented the political interference in science reports in that country during the past decade. In 2007 two further and complementary investigations in the US continued to confirm these findings: there has been broad interference in the communication of climate change scientific results in the United States ("Dirty Tricks", 2007; UCS, 2007). In Australia, while there has been less documentation of direct political interference with science communication in the past 10 years, a long-time chronicler of the climate change policy story, physicist and science and society researcher Ian Lowe wrote that "the stacking and sacking of public boards, reviews and task forces has been driven by ideology and is suppressing new ideas arising from science, to the detriment of innovation and the environment" (Lowe, 2006, p.41). These reports and other aspects of the multidisciplinary literature confirmed my professional understanding as a media worker that controversial science and society research messages face many influences and interpretations that have little to do with the scientific "facts".

Anthropogenic climate change may be the ultimate science and society story in that context. A longitudinal study was indicated once the early good public knowledge was identified. Then a further examination of the literature showed that while others have provided a thoroughly researched chronology of policy and business influence relating to climate change in Australia during the period of interest, there has been little research conducted on related communication and its effect on public knowledge in Australia during this period, allowing an original contribution through this thesis. The identified influences on communication may help shed light on the interaction of science, media, and policy on this topic and possibly others that are seen as controversial environmental research.

At the *meta* level of events during the study period, the thesis looks at some perspectives and ideas that gained cultural dominance (hegemony) during the 1990s following a brief attempt to reconcile environmental and economic values from 1987 to 1991. The upsurge of economic market fundamentalism, in tandem with a return to a familiar battle with environmental ideas and science, came to dominate policy responses. In addition to economic beliefs which arguably had little grounding in evidence, the values and beliefs examined in the thesis included traditional assumptions about human and Christian exceptionalism, and beliefs in technology and the "techno fix". I suggest that these values expressed by political, business, and some religious elites, and amplified by the media, can help explain political responses to anthropogenic climate change during the 1990s as internally consistent despite their dismissal of risk or misreading of the science. The analysis looks at how communication was reframed in the context of these and other influences.

At the *macro* level, policy, media, and science information pathways and interaction are examined. For example, it helps to know that the media, which co-frames the discourse agenda and narrative with politicians, has its own structural imperatives and these also have implications for science communication.

At the *micro* level are cultural factors within science itself, and the influence of changing organisational structure. Interdisciplinary differences have affected the communication on climate change, including shaping the views of some sceptic scientists. It is argued that the prominent role of sceptics in the public discourse has been encouraged by elites hostile to the conclusions of climate change research.

Methods

Grounded theory and adaptive methodology proved most appropriate for a work of synthesis with few fixed theoretical underpinnings. The thesis is structured as a narrative interplay between multidisciplinary findings from the existing literature and original evidence gathered from the documentary record—public documents and media reports—and additional details from interviews with witnesses and players from that time.

From a scoping survey of relevant literature from the humanities, and a review of the field of science communication and public understanding, an analytical lens presented itself: to look at how climate change information was "framed" in the public discourse over time, i.e. a science history perspective with a communication focus. Applying a framing lens across the study period became the backbone for a qualitative review of the evidence. This involved first finding and then reviewing comparative documentary material in the public domain—examining discourse language and framing in media reports, government documents, and government proposals for action, in the context of other material from the relevant years—particularly popular science books, also public opinion polls which now function as history. This evidence is supplemented by testimony from interview data. This method allowed a communication picture to emerge comparing the early, middle, and later study periods.

The adaptive methodology permitted shifts in relative emphasis as the thesis evolved. Thus interviews, which were originally expected to play a more central role, were relegated to a supporting role once it became clear that individuals' historical memory was not as comprehensive or as accurate in regard to events as the written documentation, that is, newspaper reports or government documents. This was particularly striking for the memory of the interim emissions reduction target set in 1990. Interviewees selected for their participation in events of the late 1980s and1990s, including former federal government ministers, had either a hazy or no recollection of this significant milestone.

Overview of the Thesis

Chapter 2 examines the background science to this study: the concept of anthropogenic climate change, a new idea for many people—the idea that humans are now a force of nature capable of altering basic earth systems such as the atmosphere. The thesis does not attempt to adjudicate the science but accepts as a baseline of the scientific "facts" the IPCC reports of 1990, 1995 and 2001, and significantly notes that these "facts" remained basically unchanged during the whole study period.

Chapter 3 follows with a more detailed discussion of theory, research design and methods. The multidisciplinary contributions to establishing a framing lens for understanding and analysing communication are explored in detail. Then in Chapter 4

the framing lens is applied to the early record of climate change between 1987 and 1992 in Australia. The analysis is based on extensive documentary material sourced from newspaper articles and government documents with supporting interview material. This material provides a baseline for comparison of later communication and framing during the 1990s.

Chapter 4 also first scans the existing public understanding literature on climate change communication to see where this topic may fit and finds that, other than media content analysis and sociological attitude studies, little has been done to research the intersect of policy, media and science with communication of climate change, particularly not of the Australian experience. Thus in the first instance, the finding and analysis by this thesis research of the good public knowledge of the greenhouse effect in the early study period offers a novel contribution to the literature as a subset of the thesis.

An original chronology of political and scientific milestones was assembled as background for chapter 5 (Table 2). In chapter 5 I first discuss and compare key response drivers to the climate change science starting from the early study period analysed in the previous chapter and then add an original analysis of the combined political and communication shifts in Australia during the further study period 1992–2001. Public knowledge and the dominant communication narrative in the 1990s are compared to the baseline from the late 1980s established in chapter 4.

In chapters 6 to 9 I examine the "how" and "why" questions of framing this science communication in a social context. Several outstanding influences suggested themselves as guiding the communication framing of the dominant narrative. Firstly, the values, beliefs, and political ideology that met the science and set and reset the communication; secondly the role of the media, its intersect with politicians and dominant ideology and the structural factors that also influenced how it reported the climate change story over time; and, finally but not least, influential factors from within the scientific community itself, including disciplinary differences, the central role of communication of uncertainty, and a brief look at organisational restructure within the public science agencies and its effect on communication. The strands are drawn together in chapter 10 with a summary and discussion of key findings. Lessons that may be extracted for environmental science communication are in Appendix 3.

In summary, this investigation identifies some ways communication framing has been constructed and, using an analytical lens, shows how communication has shifted public knowledge of a controversial science and society environmental issue—anthropogenic climate change—over a 14 year time period. I also identify some key influences on these framing shifts during the period under review. The historical canvas is the Australian experience from 1987 to 2001.

The original research findings of this study show that social and cultural factors can fundamentally change the understanding by audiences of an environmental science narrative (itself multidisciplinary in the case of climate change). The evidence also shows that this can happen regardless of the underlying scientific data which, in regard to climate change reports, remained consistent over the study period.

In the next chapter I start with the evidence for climate change as an anthropogenic event in a geological timeframe that a growing body of science suggests should be called "the Anthropocene epoch" (Ellis, 2011).

CHAPTER TWO
THE SCIENCE—LOADING THE DICE
THE ANTHROPOCENE

What we see happening with new record temperatures, both warm and cold is in good agreement with what we predicted in the 1980s when I testified to Congress about the expected effect of global warming. I used coloured dice then to emphasize that global warming would cause the climate dice to be "loaded" – for risk of more extreme weather.

Dr James Hansen, Director Goddard Institute for Space Studies, interview with Bill McKibben, December 22, 2010.

> *We believe the essential message of this report continues to be that the basic understanding of climate change and the human role therein, as expressed in the 1990 report, still holds: carbon dioxide remains the most important contributor to anthropogenic forcing of climate change ... Further, that observations suggest a "discernible human influence on global climate, one of the key findings of this report ..*
>
> IPCC report, *Climate Change 1995: The Science of Climate Change*, prepared by Working Group I—78 lead authors from 20 countries—Prologue

INTRODUCTION

This thesis accepts a priori the evidence—assembled by the Intergovernmental Panel on Climate Change, the global science review and communication channel for mainstream climate change scientists—that human activities are now the principal drivers of increased greenhouse gases in the atmosphere. The scientists call this anthropogenic "forcing", which basically means the human disturbance of a previous atmospheric balance of greenhouse gases which has kept the earth's climate and related weather fairly stable and predictable during the period of human civilisation as we know it.

In this chapter, I look at a scientific understanding about human agency in producing the phenomenon variously called "the greenhouse effect", global warming, and climate change as background to the thesis questions. A better understanding can thereby be gained of how the evidence of human agency, while not a difficult concept, challenges

long-held assumptions about how the planet and its biophysical systems work which in turn has affected the public discourse though sceptic debate.

BACKGROUND

Naturally occurring greenhouse gases—principally water vapour, carbon dioxide (CO_2), oxides of nitrogen, ozone and methane—have provided a protective heat-transferring "blanket" in the atmosphere that, within the history of human beings, has kept the earth at a moderate temperature range, not coincidentally conducive to agriculture and civilisation as we know it. But there can be too much "blanket", holding in too much heat produced on the planet and thus raising the average temperature across the globe (average—not uniform, as some people mistake it) which, in turn, upsets the previous atmosphere–ocean–biosphere balances. These disturbances have been linked to severe and unpredictable weather events and sea-level rise as ice caps melt (IPCC, 1990, 1995, 2001 and other authors).

According to IPCC reports since 1990, no "natural" planetary drivers (such as earth axis tilt or sunspot cycles) have been identified to account for the present documented warming trend and related climate change. However, the IPCC reviews and numerous individual Australian atmospheric and climate scientists (including Graeme Pearman, Barrie Pittock, Michael Raupach, Kevin Hennessy, David Karoly, Barry Brooks, Will Steffen, and Andrew Glikson), link the planetary temperature increase with increased levels of greenhouse gases in the atmosphere in the period since the Industrial Revolution. That is, the period where humans have burned coal, oil, and other carbon-based "fossil fuels" that release additional CO_2 into the atmosphere. As well, there are other greenhouse gases being released at an accelerated rate by human activities. Together and cumulatively these gases are believed to be the main contributors to the excess atmospheric "blanket" (Houghton, et al., 1990). Methane—emitted by cattle raised as livestock, as well as escaping from landfill consumer waste and from biomass such as melting permafrost and peat bogs—plus the loss of CO_2 storage when forests are cut down and land is cleared of vegetation, are other potent present-day drivers of combined greenhouse gases in the atmosphere.

The figures used in reports can sometimes be confusing. CO_2-e refers to the combined effect of carbon dioxide, methane, and nitric oxides, expressed as a CO_2 equivalent. The

combined rise of these gases reached 460 ppm CO_2-e after the end of the study period—only slightly below the 500 ppm associated with maximum stability of the Antarctic Ice Sheet (Glikson, 2009). While methane is a more concentrated greenhouse gas than carbon dioxide, it is also short-lived i.e., more quickly removed from the atmosphere. Carbon dioxide, on the other hand, persists for hundreds of years and its concentration is cumulative.

Adding more heat-holding greenhouse gases to the atmosphere metaphorically "loads the dice" for unpredictable and potentially catastrophic (to life as we know it) weather events, as noted by leading atmospheric scientist James Hansen in his testimony to the US Congress in 1988. The previous balances of ocean and wind currents and evaporation rates are disturbed, leading to heatwaves and drying trends, anomalous cold spells, and to the greater frequency of severe and unpredictable weather events—cyclones, floods, earthquakes, etc. Drying is most likely in the temperate latitudes where most agriculture is practised (Glikson, 2009). Chain reactions and feedback loops may add to the severity and "unpredictability" in contemporary terms, for example, the potential or actuality of a northern hemisphere cooling anomaly as the continent-warming Gulf Stream slows due to increased fresh water from ice melt in the oceans, as discussed in a 2009 Oregon State University research report (*Ocean Current Shutdown*, 2009).

In an open letter dated March 27, 2008, addressed to Australia's then Prime Minister Kevin Rudd, Hansen wrote:

> Global climate is near critical tipping points that could lead to loss of all summer sea ice in the Arctic with detrimental effects on wildlife, initiation of ice sheet disintegration in West Antarctica and Greenland with progressive, unstoppable global sea level rise, shifting of climatic zones with extermination of many animal and plant species, reduction of freshwater supplies for hundreds of millions of people, and a more intense hydrologic cycle with stronger droughts and forest fires, but also heavier rains and floods, and stronger storms driven by latent heat, including tropical storms, tornados and thunderstorms. (Australian science media centre, 2011)

In the letter, Hansen specifically pinpointed continued production and burning of coal as posing the greatest danger of prompting runaway climate change. In the aftermath of the 2011 Queensland floods, the Australian media and the Federal Resources Minister showed no indication of understanding or heeding this message, instead pondering (in ABC radio and television reports monitored) when and how coal production and export can resume in that state. Meanwhile, climate scientist David Karoly said in a newspaper report that the extreme La Niña rain event experienced by Queensland over months in 2011 was related to record high ocean temperatures off northern Australia, leading to more moisture-laden air—all compatible with rising temperatures (Smith, 2011, p. 3).

The IPCC Reports

The IPCC was jointly established by the World Meteorological Organization and the United Nations Environment Program in 1988 under the then Chairmanship of Swedish meteorologist Bert Bolin (who helped initiate the concept of ecologically sustainable development with the Brundlandt Report and shared the 2007 Nobel Peace Prize with Al Gore). The IPCC's goal was to assess the scientific research, and also the research on likely environmental and socio-economic consequences, and to advise governments on response strategies to climate change (Houghton, Jenkins, & Ephraums, 1990, preface).

Three working groups were established on science, impacts and response, and this pattern and mandate has continued with successive IPCC reports released every five years. The IPCC issued four assessment reports between 1990 and 2007 (with more to follow). The organisation's working groups —composed of hundreds of academic experts in the relevant sciences, economics and policy arenas—provide global advice to governments. This is based on reviews of thousands of papers in the available peer-reviewed and published literature. According to the federal government's *Climate Change Newsletter*, the 2nd IPCC Assessment report, published in 1995, was written and reviewed by some 2,000 scientists and technical experts from 130 countries, and references 10,000 papers as the basis for the scientific report (*Climate Change Newsletter*, *8*(1), 1996, p. 1; also mentioned in *Climate Change Newsletter*, *9*(1,2), July 1997, p. 1).

The media and public are most familiar with the short-form IPCC *Summary for Policymakers*, which is reviewed by participating government representatives after the

expert panels have done their work. This is a compromise document that errs, if anything, on the cautious side in regard to the likely influence of anthropogenic activities ("forcing") on climate, according to CSIRO climate scientist Michael Raupach (personal communication, 2007).

The first IPCC Assessment Report of 1990 emphasised in plain English the causes and risks of climate change and response strategies for policy-makers (Houghton, et al., 1990). This led to the creation of the United Nations Framework Convention on Climate Change (UNFCCC), the key international treaty to reduce global warming and cope with the consequences of climate change signed in 1992. The various international fora convened to negotiate global emission reductions such as Kyoto in 1997, and most recently Copenhagen in 2009 and Cancun in 2010, operate under this convention. Subsequent IPCC reports were issued in 1995, 2001 and 2007. The 1990, 1995 and 2001 assessments provide some benchmarked dates and assessments used in the "event framework" and comparison periods for the communication analysis in this thesis.

HUMANS AS PLANETARY FORCE

> The current rate at which CO2 is rising, 2 ppm per year, is unprecedented in the recent history of the Earth, with the exception of the onset of greenhouse atmospheric conditions following major volcanic episodes and asteroid and comet impacts, which led to the large mass extinctions [*and ended planetary periods like the Jurassic and Cretaceous]*... (Glikson, 2009)

The idea that the human species and its societies are a new "force of nature" capable of altering planetary systems is a relatively recent one. That we have entered a new epoch called the "Anthropocene," is still resisted by some traditionally trained geologists, meteorologists, and others, and this has had implications for present-day sceptic debate. However, physicist and science historian, Spencer Weart, has described the now mainstream climate science discovery path anchored by the hypothesis of Swedish scientist Svante Arrhenius in the 1890s that burning fossil fuels could raise global temperatures. From there a complex, multidisciplinary research effort has led to the present-day understanding that human activities are changing the atmosphere–ocean–biosphere balance resulting in the "greenhouse effect". Weart (2003) noted that at the

turn of the 20th century and for a long time thereafter, deeply embedded in human culture was the belief that either God or nature would take care of any human impacts:

> Hardly anyone imaged that human actions, so puny amongst the vast natural forces, could upset the balance that governed the planet as a whole ... It was traditionally tied up with a religious faith in the God-given order of the universe ... Such was the public belief and scientists are members of the public, sharing most of the assumptions of their culture. (p. 9)

Not only was it considered unlikely that humans could affect earth systems, the rate of change indicated by climate models went directly counter to long-held beliefs and principles—promoted particularly by geologists who had explained the phenomenon of coming and going ice ages for a disbelieving scientific community a century earlier. The discipline has held since, as a core understanding, that any change to planetary systems and climate could only be in a manner that had happened before (and indeed there had been many previous hotter and colder periods) and this could be read from the geological evidence they could measure and analyse on the ground.

As far as they could tell, all those previous climatic changes occurred over thousands, if not millions, of years, prompting a basic scepticism about rapid change induced by human activity. Looking to the more recent past to predict the future has been the training and work of climatologists and meteorologists during the early and mid 20th century. They constitute another prominent group of sceptics. The influence of scientific beliefs and values, and their impact on the climate change story, is explored further in chapter 8.

During the second half of the 20th century other scientists were looking at many more planetary systems in detail—including the capacity of the oceans to absorb CO_2, thus delaying measurable on-land impacts for additional decades—and they were steadily learning about the connections between the world's biomass and ecosystems. Examples are the Arctic tundra as a reservoir of methane that would be released with warming, or the weakening of the Atlantic Gulf Stream leading to paradoxical cooling in the north Atlantic. Weart chronicles that earth scientists of all stripes only gradually learned that climate could change rapidly in just the span of a hundred years or even a decade, not in fact thousands of years or geological periods as previously thought. This came with the

disturbing corollary that rapid climate change might manifest no differently in the first instance than natural variation.

Rapid Climate Change: A paradigm shift

> How fast can our planet's climate change? Too slowly for humans to notice, according to the firm belief of most scientists through much of the 20th century ... Today, there is evidence that severe change can take less than a decade. A committee of the (US) National Academy of Sciences (NAS) has called this reorientation in thinking of scientists a veritable "paradigm shift" ... but this new thinking is little known and scarcely appreciated in the wider community of natural and social scientists and policymakers. (Weart, 2003a, p. 30)

The same process of discovery was leading climate researchers to the conclusion that it was indeed human agency changing the atmosphere and the climate in this particular period of history. As early as the 1950s US oceanographer Roger Revelle, studying the uptake of CO_2 in the oceans and CO_2 emission from industrial processes, concluded with a radical idea for traditional reductionist scientists: "Human beings are carrying out a large-scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future" (Weart, 2003, p. 30).

Neither Revelle nor other researchers then foresaw just how this experiment would ramp up as both industrialisation and population exploded during the next 50 years, accelerating the level of greenhouse gas emissions accumulating in the atmosphere as well as other significant and sometimes related impacts on earth systems.

Enter the "Anthropocene Epoch"

Building on this background of 20th century research, ecologists and other scientists studying global change during the past decades under the International Geosphere Biosphere Project (IGBP) have been publishing the evidence for an "Anthropocene epoch" i.e., the beginning of a time-span where humans are the main planetary force altering natural systems. The term "anthropogenic climate change" thus refers to this human agency and is used in this thesis. The IGBP project interpreted the cumulative human impact on the previous balance within the natural systems of soil, air, water,

forests, and species. Australia became involved in 1990. The gathered evidence on anthropogenic impact, outlined below, was summarised in a 2008 lecture by IGBP alumnus Will Steffen (now director of The Australian National University Climate Change Institute).The main researchers behind this summary were Steffen, Crutzen, & McNeill (2007) and Costanza, Graumlich & Steffen (2006). These authors propose a reconceptualisation of history, which tracks the evolution of modern societies against natural system benchmarks—in this case, CO_2 in the atmosphere. The story presented by Steffen goes as follows.

Stability for about 250,000 Years

About 250,000 years ago, fully modern humans emerged in Africa. At that time, the concentration of CO_2 in the atmosphere was very low—somewhere below 200 ppm—compared with today's 390 ppm. Atmospheric methane was similarly low. The concentration of both these gases rose for centuries at a time (but not above 240 ppm) and then fell for longer periods of time. This pattern steadied at 240 ppm from the beginning of agriculture, 5,000–7,000 years before the present, and through the great European civilisations of Greece and Rome.

Early human activities that may have contributed to relatively small elevated levels of CO_2 included fire-stick farming, forest clearing, and megafauna extinction according to the authors cited in Steffen 2008 (the megafauna reference might benefit from further explanation). Data for these conclusions come from Greenland ice cores.[1] There is also a theory that human influences on the atmosphere changed at the time of agricultural expansion towards elevated CO_2 from the natural variability measured from previous epochs. However the dramatic increases in CO_2 levels started with the industrial revolution as shown in Figure 1.

[1] Ice core data have been collected by the US National Oceanic and Atmospheric Administration (NOAA) among other expert worldwide agencies. NOAA's website states that data from polar and mountain glaciers and ice caps are archived yielding "proxy" climate indicators from the past in oxygen isotopes, methane concentrations, dust content, and other parameters http://www.ncdc.noaa.gov/paleo/icecore.html).

Figure 1 Stages of the Anthropocene

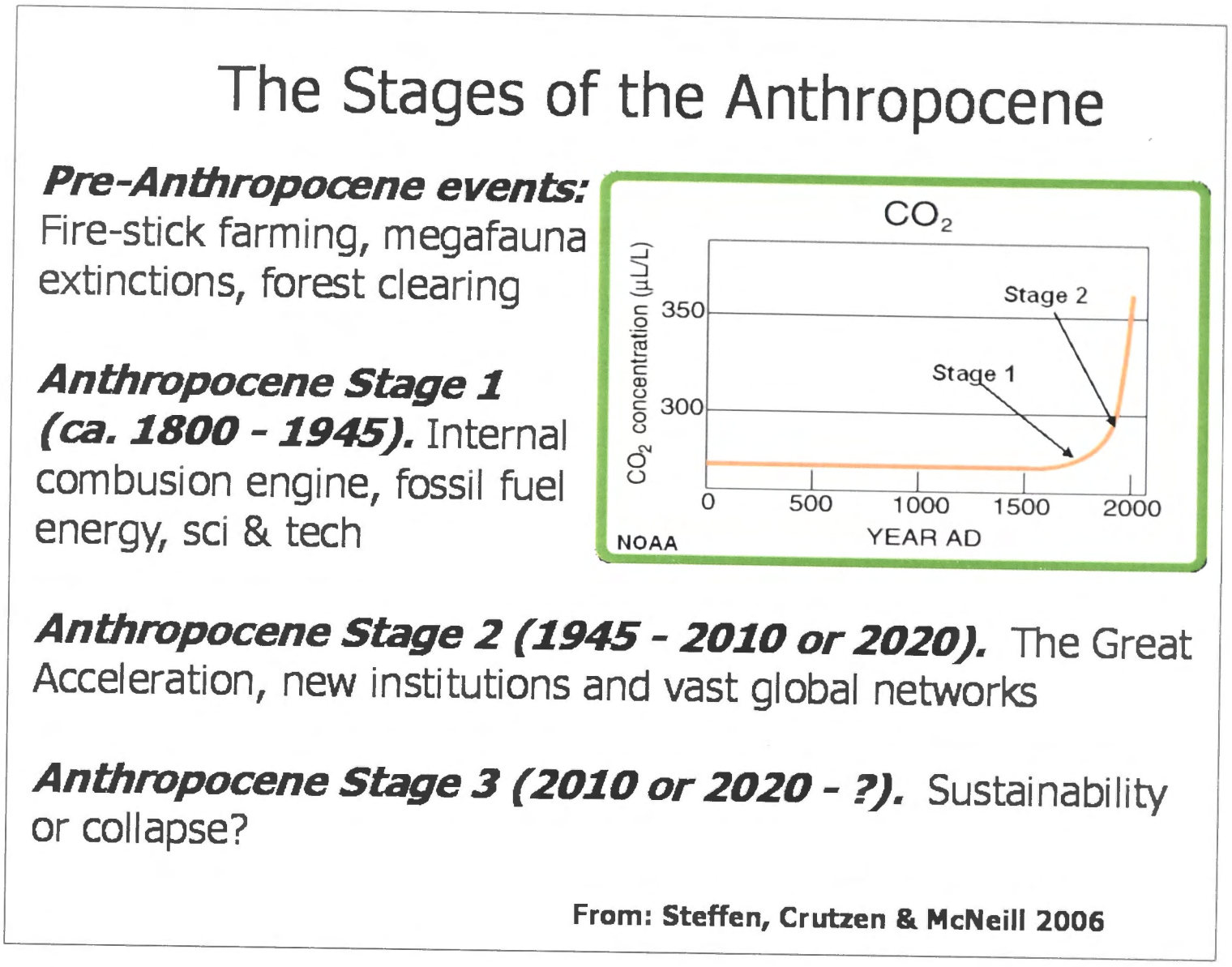

Figure 1. *Proxy evidence from 250,000 BC to the 1800s indicates natural systems remained remarkably stable in greenhouse gas concentrations until the beginning of the Industrial Revolution. (Steffen, Crutzen & McNeill, 2006, in Steffen, 2008)*

CO_2 Levels and the Industrial Revolution

Steffen et al. indicate that CO_2 levels remained fairly constant at something like 270 ppm or lower until the beginning of the Industrial Revolution. Starting around 1800 came the invention of the internal combustion engine, fossil fuel energy, and other forms of "progress" made possible by modern science and technology. CO_2 levels started climbing slowly. However, during the period these authors call "Anthropocene stage 2" (1945 to 2010 or 2020), CO_2 levels rose rapidly and are still climbing (390 ppm at the end of 2009).

Theory of Background Natural Cooling

Paradoxically, the rise in CO_2 and other greenhouse gases, prompting higher planet temperatures, are seen by some theorists as currently shielding human civilisation from the natural climate variability pattern of the past millions of years. The pattern is ice ages (the norm) broken by short interglacial periods. Agricultural civilisations emerged

in a balmy interglacial that started about 20,000 years ago. According to Ruddiman's still controversial theory published in 2005, the planet was "due" for the start of another glaciation about 5,000 years ago but this was countered by early human agricultural activity starting 8,000–12,000 years ago. Others have offered contrary evidence related to the relative earth–sun rotations indicating the current interglacial period is unusually long-lasting all by itself, without accounting for the warming effect of anthropogenic greenhouse emissions (Ruddiman, 2005).

According to Ruddiman, early agricultural activities produced enough greenhouse gases to offset the cooling trend—instead warming the planet by almost 0.8°C from the previous long-term average. A further 0.6°C has been added in the past century of rapid industrialisation. The theory postulates that once fossil fuels are depleted and the CO_2-induced temperature rise peaks and falls, the natural pattern will reassert itself with a glacial cooling. Complicating the effects of global warming or natural glaciations are possible systemic disruptions due to global warming—for example, evidence that changes to the continent-warming Gulf Stream could bring on a glaciation in the northern hemisphere in the short term.

The "Great Acceleration" and Biophysical Responses

Short-termism in human thinking, or psychological concepts of how humans view the world around them, including "creeping normalcy" or "landscape amnesia" [2], block day-to-day comprehension of what accelerating human activities represent—whether it is human numbers, number of dammed rivers, forest destruction, or the impact of motor car emissions in a timespan that geologically is a nanosecond or less. In his study of how societies fail, Diamond (2005) calls global warming a pre-eminent example of a "slow trend concealed by wide up and down fluctuations" (Diamond, 2005, p. 425). He likens the denial of climate change by leading politicians including former US President George W Bush (and John Howard in Australia) to the elite of "the medieval Greenlanders [who] had similar difficulties recognizing that their climate was gradually becoming colder, and the Maya and Anasazi (in Central and North America) [who] had trouble discerning that theirs was becoming drier" (Diamond, 2005, p. 425).

[2] Diamond defines "creeping normalcy" as slow trends concealed in noisy fluctuations that people get used to without comment. "Landscape amnesia" is forgetting how different the landscape looked 20–50 years ago (Diamond, 2005, p. 425).

Figure 2 Biophysical Responses to Accelerating Human Activity

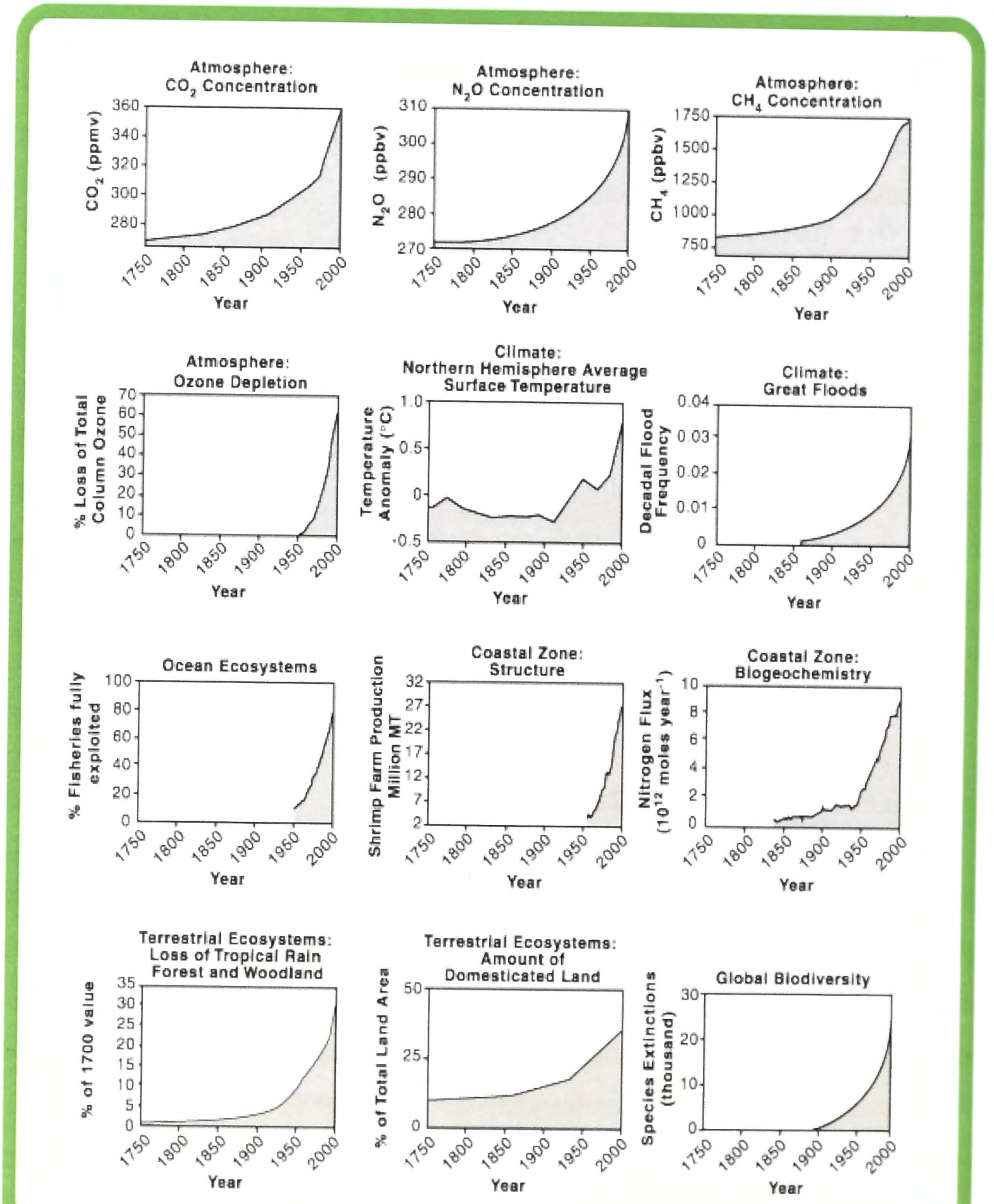

Figure 2. Human acceleration of resource exploitation compared with biophysical impacts: matching impact curves found across many benchmarks from atmospheric CO_2 to fully exploited ecosystems and loss of forests (Steffen et al., 2004, in Steffen 2008).

The graphs in Figure 2 tell the story of how the biophysical world has been responding to the human acceleration of resource exploitation. We find a matching curve of impacts—away from the relative stability of previous centuries in human history. We

see greenhouse gases, ozone depletion, full exploitation of fisheries, loss of forests, and species extinctions (among other benchmarks) zooming upwards in just over 50 years.

The net result of maximised resource exploitation with industrialisation and population growth is described by the metaphor of a "global footprint". The implication is that humans are depleting the "natural capital" of the planet at an unsustainable rate in comparison to how many earths we would need to keep up with our demands (more than one by 2001).

In similar fashion, humans, by burning fossil fuels and other greenhouse gas-emitting activities, are changing or altering climatic patterns—with impacts such as increased cyclone force and frequency, increased flooding, and the heatwaves of the past decades, all set to also accelerate. Worldwide and in Australia there is also evidence in the past decade of plummeting water supplies related to rainfall shifts, heat, and evaporation. So-called "one in 100-year" intense bushfire and extensive flooding have followed in quick succession, and have decimated communities and regions. Steffen and his co-researchers postulate that by 2050, heatwaves (and their flow-on effects) will be an everyday event.

The Anthropocene Stage 3

Steffen et al. and other researchers say the evidence shows that human impact is different from previous natural cycles and has made a short, sharp upward change to the pattern that had reigned for 250,000 years and longer of rises and falls in atmospheric CO_2. The evidence indicates that concentrations of the gas stayed below 300 ppm until the last 50 – 60 years and has risen to 350 ppm and beyond in that short time frame. The data for accelerated CO_2 concentrations come from atmospheric CO_2 measurements (Keeling & Whorf, 2004) and also from Vostock ice core data published in *Nature* in 1999 by Petit et al. (19 researchers from three participating countries, their findings summarised at http://www.daviesand.com/Choices/Precautionary_Planning/New_Data/)

According to a press release for the joint French, Russian and American Vostock ice core analysis, the highest levels of CO_2 and methane (CH_4) found for the last 420,000 years is "far below" present (1999) concentrations of both carbon dioxide and methane, which the authors therefore call "unprecedented" (Petit & Raynaud, 1999).

From the perspective of the past 1,000 years, the data behind the Mann and Bradley (1999) now famous "hockey stick" graph has offered further evidence of a sudden short, sharp spike of CO_2 concentrations at the end the 20th century. These data have also further confirmed that CO_2 levels and temperature recordings have been in synchrony over time.

Box 1 Global Temperatures Over Time: The "Hockey Stick" Case Study

Global temperatures over time: A case study of sceptic attack on evidence for anthropogenic change—the "hockey stick" controversy

The public, sceptic controversy generated by the Mann et al. studies of the correlation between recent rising CO_2 levels and rising temperatures illustrated in the "hockey stick" graph, Figure 3, is instructive for two reasons: (1) for the scientific evidence of anthropogenic impact and (2) how this has been questioned by some elements of the broader academic community and by non-specialists, thereby influencing public understanding in the direction of "scientists can't agree," a key aspect of a public response of uncertainty.

Figure 3 The Disputed "Hockey Stick" Graph

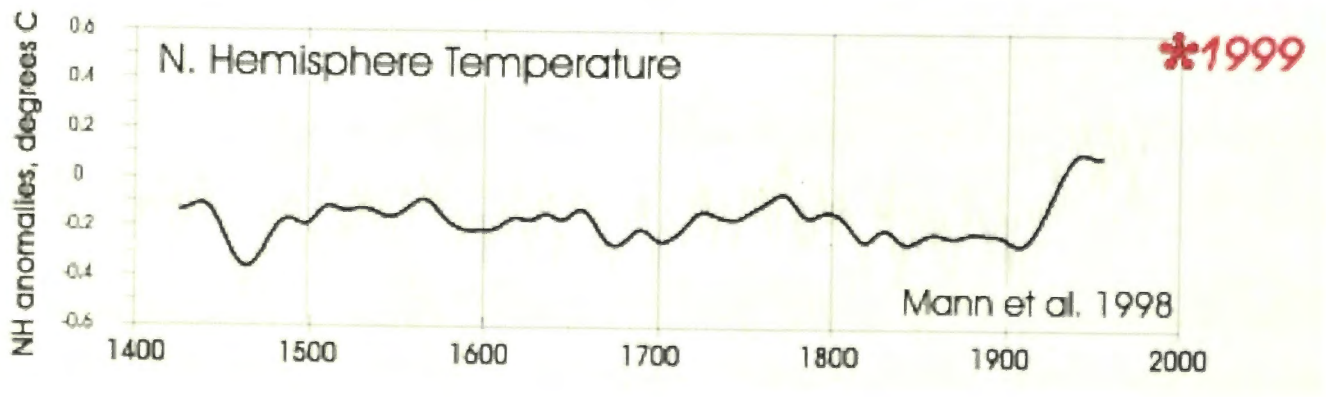

Figure 3. Proxy records do not extend to the present day; for this reason the red star (located on the graph) marks the approximate northern hemisphere temperature in 1999. Source: Retrieved 11 January 2011, from http://www.ncdc.noaa.gov/paleo/globalwarming/mann.html.

The so-called "hockey stick" controversy has centered on proxy assessments made in the late 1990s by palaeoclimatologists Mann, Bradley, and Hughes of temperatures in

the northern hemisphere for the past 1,000 years—showing a relatively sharp rise in temperature from the early 1900s to the present—shown in this graph. Anthropogenic agency is indicated by comparative evidence from all available proxy data—pollen, dust, growth patterns, ice cores, and tree rings, as well as historical records. The researchers showed that CO_2 concentrations in various periods, when overlaid with the temperature data, give a definite correlation (Mann, Bradley, & Hughes, 1998, 1999). The authors concluded that while various inputs—including volcanic eruptions and the sun, as well as greenhouse gas emissions—were responsible for temperature increases in the past 600 years, anthropogenic greenhouse gas emissions have been principally responsible for increases in the 20th century (Mann, Bradley, & Hughes, n.d.).

The temperature record became known as the "hockey stick" graph because of its shape. Comparative proxy assessment for temperatures and atmospheric gas concentrations are used by researchers to gauge conditions previous to modern measurement abilities available from about 1850 onwards. They are a well-accepted technique within palaeoclimatology, with a range of uncertainties based on the nature of the data.

After the hockey stick graph appeared in the 2001 IPCC report, exciting much citation including in the media, a long-running sceptical attack erupted, challenging the validity of these data. The challenge to the data was amplified by the politically conservative business newspaper *The Wall Street Journal*, and eventually led to a political investigation of the scientists involved by a US Congressional Committee (with a separate subcommittee investigation chaired by an avowed climate change sceptic). Of particular note to this thesis project was the intersect between a technical challenge by professionals not central to climate change research, the involvement of a respected media outlet, and attempts at political intimidation of the principal authors.

"Climate of Distrust" was the headline of a July 2005 editorial in *Nature* that outlined the political nature of the Congressional enquiry, calling it the latest in a series of political attacks on science. It started: "The story has become so familiar that new twists in the plot cease to outrage. Time after time, in agency after agency, political factors have prevented US science from serving its time-honoured role in informing government decisions" (*Climate of Distrust*, 2005, p1).

Leading the 2003 criticism of Mann et al.'s statistical data and related computations

were two Canadians: Stephen McIntyre, an administrator (with a mathematics background) in mineral exploration companies; and economist Ross McKitrick. This offers more evidence for the thesis that climate change public knowledge is very much a science and society exercise that can be framed and influenced by deliberate "blocking" activity or by honest beliefs and confusions, and sometimes by criticisms from actors outside of the main research stream. It is also clear from the historical evidence that, thanks to internet sites, such sceptical criticisms have a long shelf life, even when supposedly laid to rest. The website http://www.realclimate.org, a popular science website staffed by climate researchers, delves into the myths that become "fact" in many newspaper opinion pieces and political speeches as a result. See (http://www.realclimate.org/index.php/archives/2004/12/myths-vs-fact-regarding-the-hockey-stick/). This could be a valuable research project in itself.

According to the realclimate site and other sources, in 2003 the US Congress decided to investigate, after an article in *The Wall Street Journal* publicised McIntyre's criticism, previously published in academic journals.[3] The issue before Congress became Mann's reported refusal to provide data to the two Canadians (which he eventually did). This led to a grilling before a special Congressional subcommittee chaired by avowed climate change sceptic Congressman Joe Barton. Barton reportedly requested Mann's (representing the team) source code, archives of all data for all of his scientific publications, identities of his present and past scientific collaborators, and details of all funding for any of Mann's ongoing or prior research, including all of the supporting forms and agreements.

The Congressional investigation called on a panel of scientists convened by the mainstream National Research Council of the US National Academy of Sciences, which a year later wrote:

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[3] In 2003, Stephen McIntyre and Ross McKitrick published "Corrections to the Mann et al. (1998) Proxy Data Base and Northern Hemisphere Average Temperature Series" in the journal *Energy and Environment*, *14*(6), 751–772, raising concerns about their ability to reproduce the results of MBH (Mann, Bradley, Hughes). The IPCC 2007 report states that "Wahl and Ammann (2007) showed that this was a consequence of differences in the way McIntyre and McKitrick (2003) had implemented the method of Mann et al. (1998) and that the original reconstruction could be closely duplicated using the original proxy data." In 2004 Mann, Bradley, and Hughes published a *corrigendum* to their 1998 article, correcting a number of mistakes in the online supplementary information that accompanied their article but leaving the actual results unchanged.

> The basic conclusion of Mann et al. (1998, 1999) was that the late 20th century warmth in the Northern Hemisphere was unprecedented during at least the last 1,000 years. This conclusion has subsequently been supported by an array of evidence …
>
> Based on the analyses presented in the original papers by Mann et al. and this newer supporting evidence, the committee finds it plausible that the Northern Hemisphere was warmer during the last few decades of the 20th century than during any comparable period over the preceding millennium.
> (Committee on Surface Temperature Reconstructions for the Last 2,000 Years, National Research Council, 2006).

However, the reviewers note that substantial uncertainties with data of large-scale surface temperatures prior to about AD 1600 lower the confidence for the whole 1,000-year period compared with more definite events like the Little Ice Age cooling in the 15th century and 20th century warming.

In addition, an investigation was performed at the behest of Congressman Joe Barton by a panel of statisticians, chaired by Edward Wegman. The Wegman critique particularly took issue with the use of statistical techniques by palaeoclimatologists like Mann and colleagues without involving statisticians as funded partners, particularly those made credible by membership in the professional organisation—perhaps shedding insight into how some of the professional climate change "debate" becomes motivated, but also accepted as a valid criticism.

These statisticians also repudiated the "hottest in a millennium" claims—saying they are unverifiable—and supported the original technical critique of McIntyre and McKitrick. Wegman and his colleagues were, in turn, repudiated by Wahl and Amman (2006) with consultant statisticians on board.

So what would have happened to the "hockey stick" graph if Wegman and his colleagues, supporting the original McIntyre criticism, had been consulted on the technical adjustment at the heart of the dispute? "Absolutely nothing," according to the summary on http://www.realclimate.org, which suggested: "Can we all get on with something more interesting now?" (*The missing piece at the Wegman hearing*, 2006).

CONCLUSION

The background physics and chemistry of greenhouse gas emissions, and their heat-holding effects on the planet, have been explored and gradually understood since Swedish scientist Svante Arrhenius in the 1890s made the connection between CO_2 emissions from burning fossil fuels and the possibility that global temperatures might rise significantly. While natural variation in temperature can and does vary widely on a daily and annual basis, the contemporary "enhanced greenhouse effect" leading to global warming with related climatic impacts and changes (still far from predictable) refer to the average and steady upward temperature climb measured across the globe since the Industrial Revolution. This has involved accelerating burning of fossil fuels by humans, releasing CO_2 as well as the release through human activities of other greenhouse gases particularly methane and nitric oxide.

The upward curve of greenhouse gas concentrations has spiked dramatically since the middle of the 20th century, to levels scientists have called unprecedented in the last 420,000 years, based on ice core evidence. The 20th century timeframe is characterised by an explosion of population and technological innovation based on fossil fuel energy use. Current CO_2 concentrations are nudging upward of 390 ppm—a sudden rise of more than 100 ppm from pre-industrial levels that researchers believe remained stable at around 240 ppm CO_2, with minor fluctuations, for 250,000 years or longer. A palaeoclimatological analysis indicates mammals only started flourishing on the planet as CO_2 levels declined below 450 ppm about 34 million years ago (Glikson, 2008).

As a result of the evidence for global warming and climate change in tandem with human civilisation, and other environmental impact studies, the science community has delivered the concept of humans as a new geophysical force capable of altering planetary systems. The term "Anthropocene" has been coined and suggests a new geological epoch, dominated by the impacts of human activities such as global-scale burning of coal (particularly significant for Australia). The term "anthropogenic climate change" reflects this concept and is used in this thesis. This idea is still resisted by some traditionally trained geologists and others whose disciplines argue that past geological

events or measurable aspects of the earth's composition or changes in planetary systems (e.g., earth axis, solar flares, etc.) can be the only accepted influences on future events.

The so-called Mann et al. (1998, 1999) "hockey stick" science controversy (Box 1) is an excellent case study of how non-expert sceptic criticism, media, and politics can intersect with the science and the scientists. The case revolved around proxy data findings for the past 1,000 years linking CO_2 and temperature rise. The Mann et al. research produced a visual representation of a short, sharp rise in CO_2 levels in the second half of the 20th century – hence the hockey stick label. Despite being successfully repudiated, the longevity of the original criticism on internet sites is another noteworthy potential impact on public understanding, a pattern repeated with other sceptic criticisms.

The IPCC has reviewed and disseminated the evidence on the science, the impacts, and potential responses since 1990, and this thesis accepts the evidence of the IPCC assessments, as the scientific basis for the following discussion.

Postscript: the 2007 IPCC Assessment

The 2007 IPCC assessment , while outside the study period, is noteworthy for returning to the more definite language of the 1990 assessment and supports the anthropogenic theory discussed in this chapter, reporting: "Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial levels determined from ice cores … due primarily to fossil fuel use and land use change [deforestation], while [concentrations] of methane and nitrous oxide are primarily due to agriculture" (IPCC Fourth Assessment Report, Working Group 1, February 2007, Summary for Policymakers, p.2).

This assessment characterises resultant trends and impacts as hotter days and nights over most land areas since 1950–1970 and on an upward trend since 1900, plus increased frequency of heat waves, heavy rainfall events, increased areas affected by drought, intense cyclone activity increasing, sea levels rising and increased incidence of extreme high sea levels (p.9 and p.11).

CHAPTER THREE
RESEARCH DESIGN, THEORY AND METHODS

INTRODUCTION AND BACKGROUND

My 30-year experience as a journalist and professional communicator influenced the research questions and design reflected in the chapters. Experience had taught me that controversial science and society stories, that often concern environmental issues, are best understood within a broader social context: i.e. a context of sectoral interests or ideological influences on policy and decision-making. These influences can raise significant barriers to uptake of even highly conclusive scientific findings, or throw them into the realm of debate. Evolving research areas in environmental and earth sciences which do not lend themselves neatly to measurement may be particularly prone to controversy and paralysis when a response is called for. Applying a science and society communication analysis to such a topic can offer fresh insight on how to overcome barriers and move forward.

The exploration leading to several major thesis questions started with contemporary evidence of societal barriers to the clear communication of anthropogenic climate change (Union of Concerned Scientists (UCS), 2004). Evidence gathered by the UCS indicated that political interference in the communication process in the United States at that time included distorting and suppressing information on anthropogenic climate change gathered by government scientists and likewise interfering with other environmental and public health data as it was communicated. A statement of concern supporting these allegations was eventually signed by thousands of scientists, according to the UCS.

This was intriguing, given the magnitude of climate change as an issue facing government and populations. It raised the question of whether similar political interference or other factors had influenced the course of communicating climate change to the public and related public understanding in Australia. My starting point for exploratory research came from this question. Informal queries (like dinner table conversations) soon established a considerable level of denial and confusion in the public discourse on this topic. At the same time I did recall, vaguely in regard to details, that climate change was not a new environmental topic and had been an issue of

concern since the 1980s. A subsequent review of the public understanding of science literature—compiled in Corbett & Durfee (2004) and in Lowe, Brown, Dessai, & de Franca (2006) established that little to no research had been undertaken on the communication of climate change in Australia or on the related interaction of science communication, policy and media on public knowledge. Following further investigation in the literature of political science, human geography and media studies, the research question settled on a comparative (over time spans) science and society analysis and synthesis of how the science, impacts and responses to climate change were communicated during the period 1987–2001 in Australia.

From this basis as a science history analysis, the design of the thesis started to take shape along with the search for novel insights and findings. In the course of the multi-disciplinary literature review, and subsequent search of documentary source material, I became aware of the early (1980s) level of public communication on this topic. In fact, a startling amount of evidence was emerging that there had been a high level of public knowledge about anthropogenic climate change (then known as the "greenhouse effect") in Australia during this early period, consistent with scientific reports, warnings and understanding of risk. This review included a recollection that as a freelance science communicator during the early 1990s I had written and produced climate change information for the public under federal government contract. These publications were still in my archive, for example *Climate Change Program,* a set of fact sheets commissioned by the Department of the Arts, Sport, the Environment, Tourism and Territories (DASETT). That I was able to more or less forget that whole period prompted further questions about communication understanding over time. When I opened these publications I saw the language of scientific certainty, about risks posed by "the greenhouse effect" as a result of burning fossil fuels and there was also a range of strategies (largely to do with energy demand management) to mitigate the levels of CO_2 and other greenhouse gases that humans were adding to the atmosphere.

Research Questions and Baseline for Analysis

This then led to the first guiding research question: What was the extent and communication style of early public knowledge of anthropogenic climate change in Australia 1987–1991 and what happened to it subsequently during the 1990s?

A qualitative exploration of the public record ensued. It involved sourcing hundreds of media reports, and scores of government and other public documents—starting from the late 1980s into the early 1990s—and yielded a hitherto unanalysed historical context: Australia at this time had very strong science communication and public knowledge on this topic assisted by consistent media communication and political interest and leadership. In tandem there developed a focused and bipartisan policy response at federal and state levels unmatched in subsequent years. This finding, which of itself may offer an important contribution to the science communication and science history literature, offered an excellent baseline for a comparative, longitudinal communication analysis and study of significant influences on the communication over time (1987-2001) which is the central focus of this thesis.

The question evolved to ask: after 1991, how and why was a very substantial level of early public knowledge about the causes and risks of climate change gradually deconstructed and reconstructed differently with significant consequences for public understanding? What were the dominant influences on the communication reframe of the scientific information and policy responses as this research was finding that the science risk reports did not change significantly over time?

The timeframe 1987–2001 was chosen to coincide with both the baseline data and three international assessment series issued on anthropogenic climate change (science, impacts and response) by the Intergovernmental Panel on Climate Change (IPCC) in 1990, 1995 and 2001.These provided the scientific input accepted by this thesis. Separately they provided an opportunity to study changed language framing between the three assessment reports.

RESEARCH THEORY AND DESIGN

Within the longitudinal framework and with few fixed theoretical underpinnings to build on, it was decided that modified grounded theory and adaptive methods would be the most appropriate theoretical framework for designing a qualitative research protocol to answer the research questions. The other theoretical structure that became important to this analysis was constructivist theory. Both grounded theory methods and constructivist theory assist an exploration of how reality is socially constructed, which goes to the core of the research questions.

This thesis also acknowledges or refers to a range of additional research and theoretical understandings from the humanities including: discourse analysis Fairclough, 1989, 1992, 1995, 2003; (Dryzek, 1997); cultural hegemony (Gramsci, 1971; Gitlin1979); media and political agenda setting (Chomsky *et al.* 1992; Carey, 1995; Ward, 1995, 2001) and other authors including researchers on the agendas of neo-liberalism and *its* theories like public choice theory. Also, useful was the concept of ecological modernisation (Hajer, 1995) as well as, central to my framing argument, cognitive linguistic theories (Lakoff and Johnson, 1999; Lakoff 2005). These have been acknowledged as fields of theory or research in the body of the thesis. It was felt that a side discussion of each related literature would have distracted from the main narrative. It is a challenge for a work of synthesis to do justice to the background literature from a range of disciplines that contribute value to a science and society analysis. But the door is also open to further indepth investigations along each avenue.

The research approach is both qualitative and narrative. Having learned from the pilot baseline enquiry into 1987–1991 that the most enlightening evidence resides in public documents, I decided to explore evidence available from three areas of the public domain for the study period: government, business and other documents; newspaper archives; and testimony through semi-structured interviews. Gathering text and interview data offered triangulating evidence. Triangulation deals with validity in qualitative research and involves the gathering of different kinds of data to see whether they corroborate one another (Silverman, 2001, p. 233). The narrative approach then was to integrate this evidence with other research findings available from the literature to tell the story of what happened and analyse it for communication changes and key influences over time. The goal was to identify parameters that have governed communication of anthropogenic climate change over time and the links between science, policy and media. Ideally, the study would offer insights, results and some theoretical suggestions useful to communicating "controversial" environmental research results.

This chapter describes in further detail the design and methods related to my use of modified grounded theory, including the methods for collecting and analysing these three areas of source material and how the relative emphasis changed as the research progressed. The chapter concludes with a section on the framing lens that I developed

for analysis and longitudinal comparisons, using insights offered from constructivist theory and the fields of psychology, linguistics and neuroscience.

The narrative mode was judged the best mode to explain what happened and why, and rests on integration of qualitative analysis of primary and secondary sources. This integration of sources is particularly relevant to the chapters exploring the "why" questions of influence on the communication changes. In order to help the reader distinguish original analysis with primary sources from other people's analysis I have marked primary sources with a bullet point in the bibliography.

Definition of Primary Sources

In keeping with the science history context, I define primary sources as:

- Newspaper or magazine articles, government and other documents pre 2002 relevant to the topic of this enquiry and demonstrating discourse language and public knowledge at the time
- Interviews conducted for this thesis
- Popular books on climate change published pre 2002 and used as evidence for public knowledge at the time of publication
- Evidence gathered specifically to illustrate issues examined in this thesis, for example a 2007 *Sydney Morning Herald* report on scientists being recruited by an oil company to speak against the IPCC report.
- Scientific studies published prior to 2002— for example the relevant IPCC reports

Secondary sources are:

- Journal articles, books, magazine articles for the whole study period featuring historical, political, scientific or other relevant analysis by a particular named author.

WHY QUALITATIVE RESEARCH

Why did I choose to do qualitative research in this project? Since little to no work had been done on how climate change scientific information and policy were communicated from the late 1980s in Australia, Strauss & Corbin (1990, p.19) provide a relevant answer: "Qualitative methods can be used to uncover and understand what lies behind

any phenomenon about which little is yet known….Also, qualitative methods can give the intricate details of phenomena that are difficult to convey with quantitative methods." Creswell (1998, p.15) writes that in qualitative research "The researcher builds a complex, holistic picture, analyses words, reports, detailed views of informants, and conducts the study in a natural setting." Creswell stresses the ability of qualitative methods to analyse complexity and multiple dimensions. A key distinction with quantitative research that Creswell notes is that quantitative analysis focuses on a few variables and many cases, while qualitative researchers concern themselves with many variables but fewer cases.

This method seemed best suited to the comparative and narrative analysis and integration of texts and interviews I was developing over a historical time span. I was interested in the "intricate details" as well as the "holistic picture" regarding the changed communication frames and what influenced them. Analysing public documents and conducting semi-structured interviews are two accepted forms of data collection in qualitative methodology and are compatible with grounded theory objectives (Creswell, 1998).

Empirically, I was finding, in the course of collecting public documents and newspaper articles and considering how to analyse them for rhetoric and framing (and following an early newspaper content analysis exercise), that the documents were yielding valuable contextual and source material beyond the limited role of a quantitative content analysis. It was beyond the scope of quantitative analysis to convey the full impact of detail and nuance used in the language of sampled newspaper articles compared between periods. For that reason an early exercise in quantifying content in newspaper articles was not built upon for the whole study period, although it yielded some interesting results.

Interviews provided the third arm of the qualitative analysis, as a form of corroborating (triangulating) evidence. Silverman (2001, p.235) reviews theoretical disputes about the use of triangulation to arrive at a whole truth, but allows that triangulation has value where "it reveals the existence of public and private accounts of an agency's work," combining interview and other data to make better sense of the other.

My professional experience provided me with interview and research skills useful to finding suitable subjects and developing semi-structured interviews. Rubin & Rubin (1995) recommend a model similar to the one adopted for starting the interview process. That is, start with key informants who know or cover the area of interest, such as reporters or government officials. Studying historical and political events can also lead to interview subjects through public records such as the documentary evidence gathered for this thesis. Scientists as well as those involved with the policy process and reporters were the three main areas of interview subject selected.

After an attempt at a standardised interview protocol which proved unsuccessful in terms of eliciting reliable or useful data compared with the time demand of that process, interview questions were tailored to the background and knowledge of the selected individuals in the semi-structured mode. The interviews were designed to extend insights or corroborate evidence identified in the documentary record where those selected could reasonably be expected to have first-hand knowledge. It also served to drill down further on a topic. Rubin and Rubin (1995, p.76) say that qualitative interviews "try to capture some of the richness and complexity of their subject matter and explain it in comprehensible ways….but ensure that the results are deep, detailed, vivid and nuanced." Conducting semi-structured interviews, I included some of the techniques suggested by Rubin and Rubin to add depth, for example, follow up questions to an answer at the time or later and a conversational approach — neither part of a strict formal interview protocol.

FOCUS ON DOCUMENTARY RECORD AND COMMUNICATION FRAMING

An understanding gained during the preliminary interview work—that interviews would not be reliable enough to be the primary source of evidence (further discussed below)—placed a greater emphasis on documentary texts and on the historical narrative approach. Also, as a result of the preliminary document analysis that yielded the finding of good pre-1992 public understanding, a constructivist investigation of how communication is taken up and changed to create "reality" became a parallel strand in this investigation, outlined in section 3.1 (the framing lens).

Text analysis is under-utilised in qualitative research by social scientists according to Silverman (2001). However written texts and interviews together underline the

linguistic character of many qualitative data, which is the purpose of a communication study. The "uncertain attitude to language" in existing methodology (Silverman, 2001, p.119) was a further reason for concluding there are few existing theoretical underpinnings to apply to this study and to turn to modified grounded theory and social constructivism as theoretical approaches to answers.

Besides allowing an analysis of rhetoric and how it changed over time, the text and interview data also served as primary sources in an integration of insights with those of other authors in order to explain the influences on the changed communication and thus to answer the "how" and "why" questions

Changes and refinements as the evidence accumulated are examples of how the grounded theory process was used in this thesis. Grounded theory is "inductively derived from the study of the phenomenon it represents…one does not begin with a theory, then prove it. Rather one begins with an area of study and what is relevant to that area is allowed to emerge" (Strauss & Corbin, 1990, p.23). These authors also provide a theoretical link from grounded theory methods to constructivism when they say "if one is interested in extending an already existing theory, then one might begin with the existing theory and attempt to uncover how it applies to new and varied situations" (Strauss & Corbin, 1990, p.51).

Documentary Evidence

The two areas of documentary evidence sampled were non-fiction reports and newspaper articles.

To set a framework for sampling documents and newspaper content, I chose to look at time periods related to the release of successive IPCC reports—1990-1991, 1995-1996 and 2000-2001. In addition, the period 1987-89 was sampled as the baseline for analytical comparison to later time periods after it became clear from the initial document searches that a wealth of material about climate change was produced during those years. I called the late 1980s "the early study period".

Some 60 government, business and other public documents related to climate change science and policy were located and reviewed, with most available evidence of this type

dated from 1987-1992. About 250 newspaper articles provided evidence of the framing and rhetoric employed during successive study periods. Reports from umbrella organisations such as the Australian and New Zealand Environment and Conservation Council (ANZECC) or Senate Inquiries offered important consensus views from the time, based on their multiple inputs and overview roles.

The non-newspaper reports included government, think tank, industry and related policy and consultant material as well as popular science books. These were sampled and analysed from two library collections. One collection was held by the ACT Environment Centre library which yielded an extensive sample of government (state and federal) documents regarding response activities to the greenhouse effect and climate change from the early study period, as well as popular science books from the late 1980s and also IPCC reports. This library collection also yielded some documents from the remaining study period. These primary sources were judged to be mainstream publications reflecting public discourse from a given period.

The second library, held privately by a consultant working in the area of greenhouse and energy policy in the early 1990s, also yielded a comprehensive sampling of government, industry, think tank and popular writing (e.g., in *Newsweek* magazine) from 1987 to 1992, as well as some from the mid-1990s. Further documents relating to the whole study period were sampled from personal archives held by CSIRO climate change scientists and still others were sourced from internet searches.

Relatively far fewer government domestic action reports or popular science books were found on these shelves dating from the mid 1990s to 2001, lending support to the hypothesis gained from the political/economic literature (Bulkeley, 2001; Hamilton, 2001; Pearse, 2007; McDonald, 2005) that federal government activity and communication about risks and domestic response declined as the 1990s unfolded to be replaced by international negotiations and economic arguments for inaction. It appeared that the dominant discourse shifted from science to economics and national policy. Considerable supporting evidence for this shift was gained from the sampled newspaper record and from interviewees. One notable exception amongst government publications was the Department of Energy's climate change newsletter that allowed a comparative study within its pages of early and later framing. Contrarian publications and

publications from environmental groups filled some of the vacuum during the mid to later 1990s, but these have not been a primary focus of this study.

The 1987–1991 baseline documents were used to compare with the other early (1991), middle (1995) and late (2001) study periods and analyse changes in framing, agenda-setting and rhetoric.

The documentary analysis looked at language/rhetoric and value framing of climate change information in headlines, executive summaries and introductions of documents – individually and comparatively across different study periods. I also used comparative framing analysis of the documentary texts, particularly the newspaper texts, to examine and illustrate the tenor and framing of public knowledge at different times. Several documents are presented in Appendix 1 as evidence of early public knowledge and reporting style.

Newspaper Analysis

The baseline criteria for snap sampling newspaper articles were years at the beginning and end of the study period, .i.e., 1988–89, and 2001 and the years of the IPCC reports.

The first criterion for selecting two newspapers to review was that they needed to be "newspapers of record". This is a generally-accepted term for a newspaper with large circulation and national scope, and that generally is considered professional and unbiased (by the reading public if not the academic analysts). Australia, with a small and highly concentrated media market does not offer a wide choice in this regard. I decided to stay with one publisher Fairfax, but compare two titles with a different focus. *The Sydney Morning Herald* (SMH) and *The Australian Financial Review* (Fin Review) are two nationally-read broadsheets with different editorial missions, one being general interest and the other being the business press. This lent itself to reviews of science and political/economic coverage.

A third national newspaper of record, *The Australian,* presented a special case of known climate change scepticism during the study period. I decided to review its influence based on other researchers' work in chapter 7 but not include it in the media analysis for this particular investigation. My aim was not to do an exhaustive media analysis but

rather to provide an acceptable body of evidence of how communication changed within the mainstream press and to use publications whose editorial stances and biases had not previously been investigated. There is considerable scope for further media communication comparison and analysis, not least outside the narrow confines of daily print media to include broadcast, magazines, and the internet.

In the two publications selected, stories were sampled using Factiva, in the first instance with a search for the phrases "greenhouse effect", "global warming" or "climate change" for the defined study periods. The sampling was further refined by selecting those articles which mentioned these phrases in the headline or lead paragraph. In the 1988/1989 sample for the SMH this method cut the sample roughly to one third—from 353 to 118. A similar analysis for the Fin Review yielded 56 articles that headlined the phenomenon out of 184 for this two-year period. Using the same criteria, 193 articles were identified for the period January 1, 1990 to December 31, 1990 in the SMH. It became evident there was much material at this early period, prompting its use as the baseline.

The final selection for indepth review was to then take the first 15 sampled articles from the first six months of a given two-year period linked to IPCC reporting (for example 1990-1991 and 1995-1996) and also the first 15 from the last 6 months of the two year period. In this way for the early study period 1987–1992 inclusive (the baseline years and the first IPCC two–year period), 60 articles were sampled for one publication. Thereafter, one two-year period, yielding 30 articles, was sampled in the same way in 1995-1996 and another for 2000-2001.

A pilot quantitative analysis was undertaken after consulting some texts on content analysis. Krippendorff (1980, p.171) notes that traditional content analyses have been concerned with semantic references and evaluations of attitudes. But modern uses of content analysis may see data as correlates of the phenomena of interest or as causes or by-products: "Anything connected with the phenomena of interest qualifies as data for content analysts."

Comparative matrices were developed for the pilot quantitative study comparing 1988/89 and 2000/01. In addition to criteria (A) i.e., the mention of greenhouse, climate change and global warming and (B) mention of these in headline or lead, the following additional

criteria were added to the sampling selection for a quantitative analysis of comparative trends.

C) **SOURCE** • Scientists/technical experts
• Politicians
• NGO/Green Group
• Industry
• Sceptic
• Economists/ABARE
• Energy consultant
• Opinion (or)
• Reporter analysis

D) **DEBATE** • **Debate** (use of term) about science/predictions)
Subset of debate
• Theory (greenhouse/CC)
• Uncertainty/Uncertain (scientific)
• Sceptics/Scepticism/sceptical
• Consensus (scientific)
• Doubt human agency
E) **WHAT PROMPTED ARTICLE?**
• Scientific/technical
• Report/scientist
• Conference
• politician/politician initiative
• economic study
• NGO/green comment
• Weather
• opinion poll
• IPCC report
• Opinion piece
• Reporter analysis
• Innovation consumer news
• Industry debate
• Other, e.g. carbon market
• Special supplements
•
F. MENTION OF EMISSION TARGETS
• Emission targets for Oz/international political action, about Kyoto targets
• Targets: # of times mentioned incidental to other focus; e.g. Kyoto

G. CONTEXT – explains greenhouse effect and human agency
H. HIGHLIGHTS UNCERTAINTY amongst scientist and/or their language

The quantitative content analysis method yielded some interesting early data that helped inform the overall analysis, discussed in chapter 7. However, this quantitative method of analysis was then set aside in favour of qualitative text analysis. Consistent with grounded theory, the method evolved to incorporate extensive quotation from documentary and newspaper texts to impart the details and the 'flavour' of communication at the different study periods.

Context for the two strands of documentary text evidence was researched and incorporated in the thesis narrative. Context comes from the multi-disciplinary literature and covers the chronological, political and economic developments during the study period (and some before and after), and is cited in following chapters.

Interview Methods

Twenty seven formal semi-structured interviews were conducted between May 2006 and January 2008 with an additional 12 informal interviews gathering context and background information conducted during the same period. Follow up interviews with the same individual are counted as part of the single main interview.

The formal and then semi-structured interviews were begun in October/November 2006 and concluded in January 2008 following compliance with the requirement in Australia that research involving humans be first approved by the university (in this case Australian National University) Human Research Ethics Committee. A consent form was drawn up, approved, and presented to each interviewee (see form in Appendix 2). All interviews, except for several phone interviews, were also tape-recorded with the interviewee's permission – which is further evidence of consent. Almost all interviews were conducted face to face. One transcribed interview is attached in Appendix 2.

Those interviewed formally were asked to sign consent forms that specifically asked permission allowing their names to be used in the thesis report. I judged it to be more authentic and less cumbersome in relaying the data to use names where possible. Names have not been used for informal interview material.

Interview subjects were chosen from three professional categories: climate scientists, media workers and policy professionals or politicians and a deciding criterion was that they were professionally active in their field during the study period and therefore had first hand knowledge of events during that time. Table 1 summarises the interview categories, numbers and timeframes.

Table 1 Interview Numbers and Timeframes.

Profession	Jan–June 2006	July–Dec 2006	Jan-June 2007	June 2007–Jan 2008	Totals
Scientist	1	3	1	1	6
Media	2	1	5	3	11
Policy	1	6	1	2	10
					27

Interviewees were selected on the basis of establishing a representative but not exhaustive sample of people who were on the scene in places of influence during the study period and could comment on the documentary record in the three designated areas: climate science, media and policy. Apart from the decision to give relatively less centrality to the interview data compared with the documentary record, a consideration for the final selection of people to interview was their availability to a PhD candidate (travel resources for face to face interviews and also the factor of interviewee interest or access in taking part).

Therefore, while several players with personal knowledge and influential roles from each of the three categories were sought out and their evidence compared, this method did not require speaking to everyone who might have played a role in various aspects of this investigation. It should be noted however that key players from the time and their views – e.g. senior politicians — were also represented in the newspaper and document record and some are quoted in this report.

The project gained the recollection of two federal ministers active in the early study period (science and primary industries) and informally spoke to a third for suggestions of who to talk to. This helped to document the level of early good understanding. It was deemed important to speak to at least one of the federal ministers responsible for signing Australia's 1990 emissions reduction target (that was John Kerin). Senior bureaucrats from the 1990s department and ministry of environment, leading

atmospheric scientists and a Commonwealth research advisory committee chair as well as specialist journalists active at the time provided other perspectives on the documentary analysis.

Informal interviews were conducted with five academic professionals who had conducted science and society research relevant to the science history of climate change communication. An additional three journalists, two scientists and the former federal minister were also interviewed.

An initial scoping exercise for the interview process and also to provide information for the thesis design, involved a list of formalised standard questions based on "what happened and why". This was presented to some scientists and policy people active during the study period.

It became evident in the course of these interviews that in most cases people had forgotten important events or processes that were in the documentary record (government reports from that time, media stories), e.g., that Australia was on track to put in place an emission reduction target in October 1990. This might be due to imperfect memory for events 15 years earlier; or perhaps due to elite decision-making style so that policy directions were not widely known or emphasised across all decision-making sectors, or a combination of both influences.

Clandinen and Connelly (1994) writing about personal experience methods in qualitative research and "field texts" discuss oral history, annals, chronicles and research interviews, but do not specifically canvass the methodology that best gets around the memory issue regarding peoples' experience (in Denzin & Lincoln pp. 418-421). Creswell (1998) and Rubin & Rubin (1995) writing about qualitative interview design methods also do not canvass memory, leading to the conclusion that different interview approaches might be trialled to revive memory and that in any event consistency of evidence requires cross-referencing and multiple sources, which we know as triangulation.

I concluded that it was most likely that the issue was interviewees' recall of events, or it was lack of attention at the time, since there had been many media reports in the public domain. This conclusion influenced the change of approach to greater reliance on the documentary record and less reliance on interviews for "the facts" and a semi-

structured, more conversational approach to the interview questions. One method to sharpen recall might be to submit written questions ahead of time, which would allow the interviewee to consult records and "refresh their memory" or, alternately, to follow up with written questions which would allow the interviewee to submit additional comments having further thought about it. On request questions were sent to one interviewee ahead of time and some follow-up email correspondence was undertaken with a few interviewees, adding useful data. However this did not become a standard method in this investigation.

While not being as useful in terms of oral history as first hoped, the early interview responses did yield interesting science and society insights. They showed that not only members of the public but informed participants showed fuzzy recall of risk assessments on climate change and policy commitments that were high on national and state agendas 15-20 years ago. Such material informed the next set of interview questions as well as informing the analysis as a whole, since the question of why we ended in such a haze of uncertainty is a central question.

Parallel analysis of the documentary evidence was supplying interview questions and suggestions for people to interview in the semi-structured round, and questions became more targeted to the likely knowledge of the interviewee. It was also deemed important to keep the interviews confined in length to no more than two hours for consistency and courtesy. One interesting observation was that some interviewees could talk only about their professional role but could not, as citizens, recall the general public discourse occurring at the same time—for example compared with the wealth of public information during the early study period.

An example will help illustrate this point. One interview, with a former federal science minister (Barry Jones), was not going as well as hoped. Jones repeated himself with increasing annoyance in response to a number of questions about the discourse of the early 1990s. He said that politics revolves around three acute issues of the day and there is no room for long-term issues or at least it is not talked about in daily Cabinet meetings. The implication was that if you're not the minister responsible for an area you may know nothing about ongoing policy initiatives or longer-term "vision". According to his interview account, even though he took credit for putting climate change on the map in his 2006 book *A Thinking Reed* once he stopped being science

minister in 1990, climate change dropped off his radar screen. In the interview he had nothing to say as an informed observer. He also had nothing to say about environment being a mainstream issue during the 1980s other than that it was an electoral gambit.

However, Jones gave me a copy of a talk he presented to the World Meteorological Day Address in 1992 in which he made the point that green issues were extremely important during the 1980s for the Hawke federal Labor government election and re-election campaigns; and that in 1991, with economic downturn, the political priorities seemed to change to jobs. Environment became framed as a luxury extra, which he called extremely short-sighted in this document (Jones, 1992, p. 4). In this way, he reinforced questions about recall in interviews on historical events and the relationship of rhetoric in public speeches with later recall of events and also emphasized the value of printed documents as evidence.

DEVELOPING A FRAMING LENS FOR ANALYSIS

> *... perceptions are shaped not only by scientists but by interest groups, politicians and the media ...*
> *... the climate in the future actually may depend on what we think about it ... what we think, will determine what we do ...*
> (Weart, 2003, p. 198)

If humans have become a geophysical force as presented in Chapter 2, then this quote from Spencer Weart's book on the scientific discovery of climate change makes several key observations about the importance of communication to how we humans influence our biophysical surroundings. Weart notes that scientific communication is not a one-way affair but involves "perceptions" by audiences that translate a scientific message according to what "we think". This thinking is shaped in western democracies like Australia by interest groups, politicians and the media who then influence the general public response. Evidence for this view is offered in chapters 6–8. With this important insight, a pre-requisite for analyzing the pathway of scientific communication of climate change to the public becomes an exploration of how messages are "framed", which includes both the language of the original message, and how it is heard and then translated by elite agenda-setters and institutions.

It was therefore necessary to the understanding of communication over a 14-year period to develop a "framing lens" as a way to compare discourse language and trends in the documentary evidence over the course of the study period. The question became: What were the hallmarks of the dominant narrative from 1987 through 1991, 1995, and 2001? How did the communication change while the underlying science did not? In sum, how did "framing" mechanisms work to incrementally disengage public knowledge from the scientific facts?

In this section I look at the theoretical concepts that assist the understanding of framing. In the next chapter I then examine in detail the framing of the early public knowledge on anthropogenic climate change in the documentary evidence, as a baseline for comparison on how the framing changed in the subsequent decade and why.

A Multidisciplinary Look at Framing

As I outlined in chapter 1, social scientists have explored how social reality is constructed within a civilisation and how it can and does shift over time (Diamond, 2005; McKnight, 2005). Political science tells us that the frames and agendas that set societies' construction of social reality are relayed by opinion leaders and networks that set the daily narrative agenda together with the mass media (Rampton & Stauber, 2002; Ward, 1995; Wheelwright, 1987). Cognitive linguistics explores how frames and rhetoric are "heard," and about cognitive pathways of understanding, and psychology tells us that knowledge is a social construct (Lakoff, 2005; Yager, 1991). The cognitive linguistics insights have proven particularly useful and pointed to a different way of looking at science communication, compared with the more traditional information deficit model.

Framing compared to information deficit model

"Framing" can be seen as critical both to how a message is communicated and how it is "heard" at different levels. Broadly speaking, those levels are: framing within public policy and agenda setting; framing information to a target audience; and how we use language. These concepts, while well understood within cognitive science and some communications studies, are new to science communication as a field (Bubela & Nisbet, 2009) and sometimes considered controversial or extraneous by some academics and

scientists (Leach, 2009; Nisbet & Moody, 2007). The opposing argument appears to say that scientists as communicators do not need to concern themselves with what people "hear" from communications and/or adjust messages accordingly, for fear that they slip into public relations "spin".

One alternative to an understanding about how framing is used in public discourse is to fall back on the information deficit model of communication and also on the unspoken academic cultural model: that scientists speak amongst themselves but rarely to the wider public and that someone else out there—possibly political advisers, the media, or educators—will translate what they say into public knowledge. Information deficit for the purposes of this thesis is defined as providing the same message in a one-way interaction—from scientist to public—on the assumption that the public doesn't "get it" and that more of the same will provide the enlightenment needed. This model of public understanding and science communication has been critiqued by many researchers, particularly from the social sciences (e.g. Nisbet & Moody, 2007; Trench, 2008).

A More Likely Model—Message as a Social Construct

The social constructivist analysis of science uptake offers an attractive model of how public knowledge is established, proffered not only by theoretical constructivist studies (Fine, 1996), but also by common experience of communication. Indeed, from the fields of psychology, educational theory, linguistics, and now neuroscience comes the understanding that it is not what you "say" that matters but what people "hear" (Chomsky, 1991; Lakoff, 2005; Lakoff & Johnson, 1999). This understanding has been applied by educators as a constructivist view of learning (Yager, 1991) but also since the turn of the century by propagandists (Bernays, 1928) and, more recently, by the public relations industry. A constructivist analysis tells us that people hear or process information based on the sum of their past experience, not least through the filters of professional training (an area explored more closely by this thesis in the section on disciplinary differences, in chapter 8), as well as their cores values, including religion. It is suggested that people interpret reality through these various filters.

In keeping with constructivist theory, these multiple inputs mean that everyone reacts to information based on their memory banks and emotional triggers, which helps explain why communication can be so puzzlingly difficult. Social sciences tell us that there is

also a cultural creation of "reality" based not only on widely held physical assumptions about solid matter, but also on cultural edicts like those from economics or religion. Thus within a given culture we agree to perceive the world around us in those ways, based on an implicitly agreed mix of influences, or "myths to live by" in the words of historical philosopher Ronald Wright (2005). Philosophical relativists argue that we can never know whether there is really a material world out there beyond these assumptions and our mental constructs. There is no resolution in sight to this debate.

For our purposes, in looking at environmental science and communication, such relativism does not offer a helpful analysis, but rather a road to paralysis. So instead I assume in this thesis that there really are trees and mountains and an atmosphere out there in the real world, and that generally we agree on what they look like and how they feel, and that science tells us what they do and how they change.

We must still deal, however, with our neurological, social, and cultural constructions of "reality" in terms of how we think about the material world and about what science tells us. In the rest of this discussion about framing I refer variously to meta, macro and micro constructions of everyday reality summarised in Figure 4. Meta framing is defined here as the influence of ideas, beliefs, and agenda-setting; macro is influence within and between institutions; and micro is the use of language to address the central question of how frames operate to influence the listener.

Figure 4

Levels of Framing Scientific Communication on Climate Change

Micro frames are established by the use of language, metaphor, and the manipulation of cognitive pathways.
Macro frames are established within and between scientific and other institutions, or through the structural factors guiding media coverage, as well as the disciplinary differences between scientists that influence how they communicate their science.
Meta frames are established by ideological and belief systems

Framing and Metaphor in Public Rhetoric (Language)

"Frame" at a micro level is a conceptual construct that guides thinking. How we use language and metaphor is a basic part of this. Metaphor—defined as the use of a word or phrase that evokes a pathway of cognitive understandings—is central to human communication, according to cognitive scientists Lakoff and Johnson (1999), citing the works of psychologists Levi-Strauss, Geertz and Piaget, who were at the forefront of thinking on cultural constructivism. From this vantage point: "Our conceptual systems are fundamentally shaped by cultural constructs (and metaphors are) central to how we understand the world" (Bogost, 2005, conference paper).

Metaphors infuse much of our language use. For example, in Western culture there is the influential metaphor of life as a journey: people must have a purpose—"find their way", have "goals to reach" or they are "lost", "without direction"; those who "reach their goals" fastest are admired, or maybe they have to "find a different path" and so forth (Lakoff & Johnson, 1999).[4] Lakoff applies this understanding to techniques used in politics to reinforce certain ideas and values. A common technique is to give a positive emotional value to messages, invoking metaphorical pathways, in order to frame how to think about things (Lakoff, 2005). A similar understanding was arrived at by the early 1900s from the field of psychology, and exploited very successfully by theorists of propaganda and public relations. Seminal work in this regard was done by Edward Bernays who applied the insights of his uncle Sigmund Freud (Bernays, 1928; Curtis, 2002).

"Freedom" is a classic example of a metaphorical pathway that evokes everything we hold dear about our way of life—as shorthand, the concept merges political, economic, and cultural aspirations. Everything attached to the word "freedom" can evoke positive emotions. Advertising has long exploited this understanding. In the context of climate change response, we have the "freedom" to buy anything we want or *not* to buy energy-efficient appliances or green energy, and so forth.

The cultural values involved were explored in the late 1960s by communications professor Herbert I. Shiller, from the University of California, who wrote about the connection between mass media and American-style commerce and consumption—

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[4] Lakoff and Johnson's theory about the embodied mind—that thought is mostly unconscious and abstract concepts are largely metaphorical—has been called controversial in light of current practice in Western philosophy. However, the unpacking of metaphor use in everyday discourse can be viewed as a separate contribution without getting into the philosophical debate. This thesis makes that distinction.

which is framed as the presence of freedom—in trade, speech, and enterprise. In the war of ideas that accompanied the resurgence of neo-liberal economics since the 1970s, this also came to include freedom from government regulation of business, a perspective applied by politicians to environmental or public health issues—both relevant to climate change—that might otherwise have invited regulation (Wheelright, 1987).

Another relevant example is the use of "responsible" or "sound". Both words resonate positively in our mental construction and evoke perceptions of being careful, parental, and authoritative. "Responsible science" or "sound science" has been invoked by various sides of the climate change discourse as a shorthand way to influence public understanding of the value or status of the science—along with its antithesis, "junk" science. Reaching for the same emotional responses, "responsible science" is also used as a metaphorical euphemism for "delay", which might not sound so good.

"National interest", "jobs", "family", "battlers", "Australian working families", "Australian mums and dads": these are meant to evoke a whole framework of response, often an emotional response. Family and jobs and country are multi-cultural themes and it is a reasonable premise that most Australians can understand or respond to these emotional levers. So by linking "jobs" and "family" and "national interest" and "responsible science", or "needing more research" to messages about delaying action or challenging the science of climate change, members of the public may be induced to change their understanding—forgetting that once they were responding to frames about risk insurance, win-win energy policies, and responsible global citizenship. The manipulation of metaphor and cognitive pathways therefore are key elements of framing at the micro level.

The communication of environmental science messages from scientist and public with a focus on climate change, involves institutional interactions (macro framing) and the influence of ideas and values (meta framing). The diagram in Figure 5, below, is an attempt to sketch the possible interplay of these two framing levels along a pathway from science message to public. It shows that this communication is likely to be a circuitous path subject to a host of cultural and institutional influences.

Figure 5

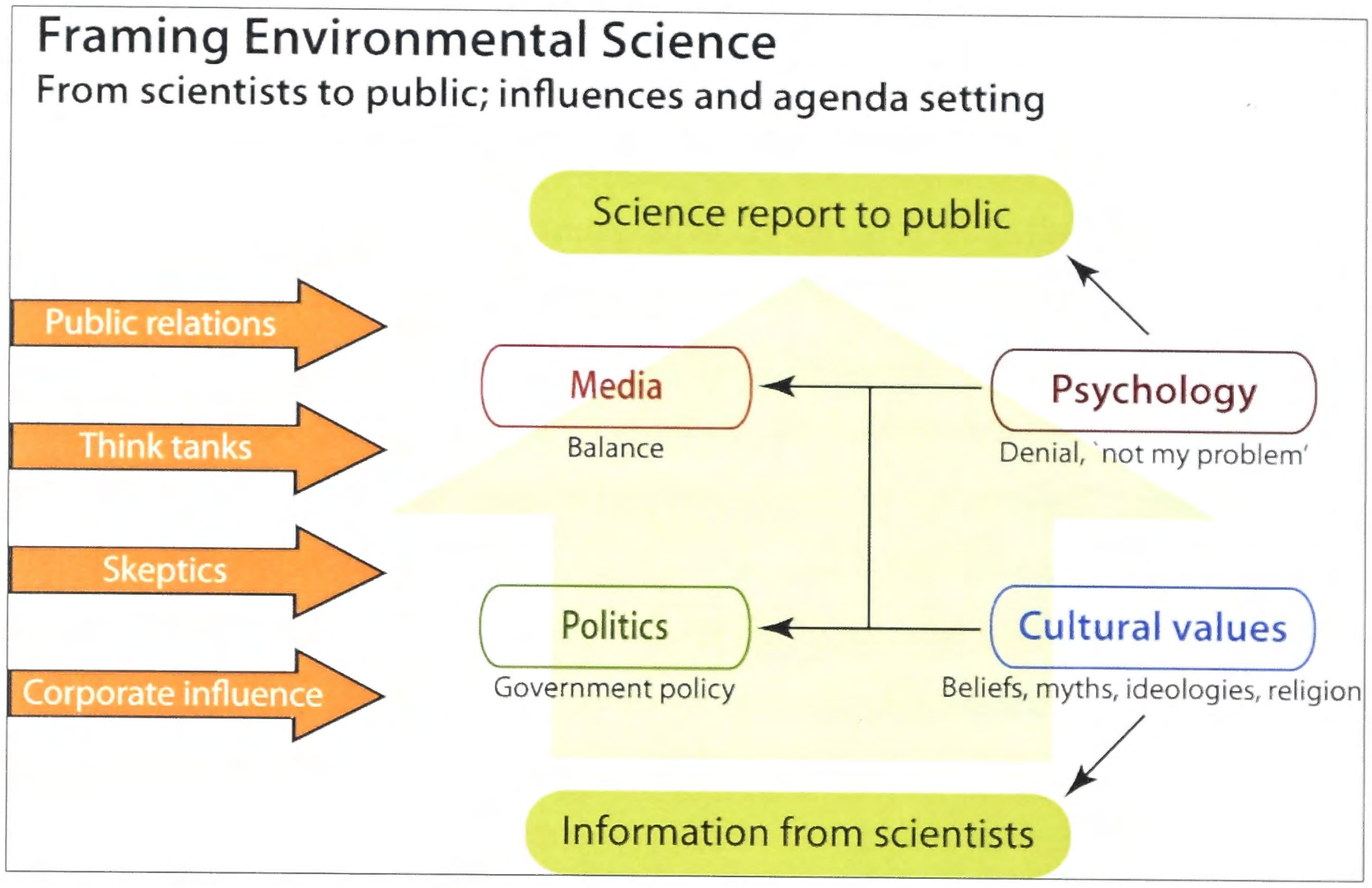

Figure 5. Some suggested pathways of influence on frames about environmental science.

Specifically, environmental science communications are framed through social institutions which, in turn, are influenced by ideas/ideologies, beliefs, values, and human psychology. Politics and the media are two primary institutions in the framing of science messages, along with scientists' own culture, which in turn is not immune to cultural beliefs and values.

Framing the Dominant Narrative

In this analysis, policy-makers, politicians, and the media "hear" and then "frame" the scientific facts according to their mental constructs—values, beliefs, and priorities. What they say, often using the metaphorical language already discussed, guides the way the rest of us tend to think about reality. This basic understanding guides the exploration of evidence by this thesis and is called here the dominant narrative. It is also suggested that "controversial" science issues are most likely to attract various levels of framing rhetoric and cultural narratives. Environmental science is often "controversial", in that it attracts interests and debate from various sectors of society.

Lakoff (2005), in his assessment of framing and metaphor in political contests, suggests that rhetorical framing of issues by politicians, the media, and other opinion leaders will

steer the public discussion regardless of the "facts" or evidence—in this case, the facts espoused by expert scientists and communicators on a particular issue. Lakoff's suggestion is supported by the arc of climate change communication over time, and the influences on that communication, explored in this thesis.

These understandings from cognitive science raised the question: How has the dominant narrative and the use of metaphor and targeted language been applied in the "culture wars" or "battle of ideas" that have raged around the science of anthropogenic climate change? An example of how it can be, and has been, applied was outlined by a very successful practitioner and theorist in the understanding of what people hear or like to hear because they identify with the underlying values. US political consultant and pollster Frank Luntz developed whole manuals for conservative politicians during the past two decades, telling them what to say to have the desired impact, and he advised particularly about climate change.

This area could be dismissed as "spin", but is in fact well worth studying because these techniques arguably helped set climate change communication for a decade and longer in the US, and in Australia in the same way. In a key memo on climate change, Luntz (2003) advised that a primary strategy had to be stoking the fires of scientific uncertainty and to have scientists do the stoking. Should people come to believe that climate science is settled, he feared they would want to act accordingly and demand action from their governments. This was indeed how Australia appeared to react around 1990 when the dominant narrative proposed that the science was clear-cut and the government opted for a vigorous response.

On the other hand, an Australian Broadcasting Corporation *Lateline* program on July 13, 2009 featured the author of a recent book on climate change politics, Lord Anthony Giddens from the London School of Economics. He told the interviewer that in his surveys of populations in different countries an average 40% of respondents were sceptical that scientists agreed about anthropogenic climate change. This means that the framing urged by the public relations consultants of the world has been quite successful—given the actual case, as Lord Giddens also pointed out, that perhaps 1% of scientists working in the field of climate change remained sceptical of the general message. Of course, this also begs further analysis of whether the general public differentiates between scientific disciplines or treats scientists as interchangeable expert

voices. The pivotal influence of the "scientists can't agree" frame is explored further in chapters 8 and 9.

The Mass Media

At the macro, or institutional, level of framing, the media is a key player transferring communication from the scientist or politician to the public and thereby producing public knowledge. Sociologist of science Dorothy Nelkin (1995, pp. 2–3, cited in Palfreman, 2006, p. 39) argued that public understanding of science in particular is primarily influenced through "the filter of journalistic language and experience". The view that the media is the primary framer of scientific messages is reinforced by more recent studies showing that in the US as in Australia, the public gets most of its science information through the media (Denemark, 2005; Russell, 2006).

Taking up Nelkin's conclusions a decade later, US science writer Cristine Russell produced a working paper for the Joan Shorenstein Centre for the Press, Politics and Public Policy, which analysed the interface of controversial science, media, and politics. She found that: "Ultimately how the media covers or 'frames' these debates —the slant of the articles and the sources of scientific and political information—helps shape the way both politicians and other leaders, as well as the public, view scientific and technological issues" (Russell, 2006, p.19).

Media "issue cycles" is a term coined by social scientists for the same area of analysis, and here too a recent review (Broussard, Shanahan & McComas, 2008) found that a good many researchers have decided that issue cycles are socially constructed, particularly through national journalistic practice and culture. In addition, there are many publics (educational background, ethnic, religious, etc.) (Stossel, 2008), and constructivist analysis tells us that they "hear" messages based on the sum of their experiences and their core values, which appears to be a key lesson for science communicators.

Policy-makers, Media and the Dominant Narrative

The dominant narrative is, however, the product of more than just issue framing by the media. Other research suggests it is most likely that the framing or narrative-shaping is

a revolving door between the media, and politicians and other opinion leaders, (e.g., Boykoff & Boykoff, 2007). Indeed, Russell and other communication scholars agree with cognitive scientist Lakoff that the (diverse) publics take their cues on science from politicians and other opinion leaders (via the media), and "filter it through underlying values like ideology and religion" (Russell, 2006, p. 19, quoting communication researcher Matthew Nisbet).[5]

In this way the media in its various guises sets the issue cycle in conjunction with policy-makers, politicians, and other opinion leaders, which can include scientists. Together they "frame" the dominant narrative of reality presented to the public. This is not a new concept, but it is not prevalent in the science communication literature. The famous Canadian critic of mass communications, Marshall McLuhan, said right after World War II that the mass media shapes our daily narrative of reality by delivering drama featuring "us and them", good and bad, winners and losers (McLuhan, 1951). This has not changed.

Theories and research on agenda-setting are also relevant here. Australian research by Ward (2001) has looked at how media professionals and policy-makers together set the issue cycle of what is considered important. Political scientists tell us that Australians prefer an arms-length democracy where they make a choice at election time, and then let the politicians set the specific agendas and expect that they are taking care of issues (Johnson, 1987; Ward, 2001). This has obvious implications for the power of political leadership as another key influence on framing an issue like climate change. The evidence from this thesis has supported the concept that, in Australia, media and politicians/opinion leaders together, and sometimes separately, frame the dominant narrative that informs our sense of "reality". Arguably in the late 1980s scientists were considered influential opinion leaders, judging by their influence on public understanding at that time.

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[5] Analyses of US practice in the science, policy, and media interface are used here as corroborative evidence. The data collected for this thesis indicate broadly comparable patterns of influence by politicians and other opinion leaders, similar beliefs, and similar media structures during the period of interest (i.e., 1987–2001) on the controversial science and society subject of climate change.

Indeed, an application of the framing lens to climate change communication from 1987 to 2001 shows that public understanding — including by the media and the politicians––changed dramatically over the study period from agreeing with the science and ready to respond to confused and contrary, while the scientific facts or messages stayed largely the same. In the next chapter I look at the framing of the early study period 1987–1991, which sets a baseline for comparing the later shifts in communication. These findings about communication and of early public understanding are also a novel contribution in their own right to the history of public understanding of climate change in Australia.

CHAPTER FOUR
PUBLIC UNDERSTANDING AND EARLY FRAMING AS A BASELINE

BACKGROUND: THE RESEARCH LITERATURE

Corbett & Durfee (2004), in their report on certainty and context in media reports, provided a review of the public understanding literature as it pertains to climate change. Also, Lowe, Brown, Dessai & de Franca (2006) comprehensively reviewed the public understanding literature and various research methods for their study on lay perceptions of climate change. From this review, Lowe et al. summarised the findings that:

- the general public gains most of its knowledge about science from the mass media (and) science information is often skewed or lost in translation.

- there has been much misunderstanding of the causes and consequences of climate change and also confusion with stratospheric ozone depletion, and perhaps most significantly for this study, "knowledge of the forces that shape the perceptions and response of the public is limited" (Lowe et al., 2006, p. 436, quoting Bray and Shackley, 2004).

Corbett and Durfee of the University of Utah found in their 2004 review of the literature that while general public awareness of global warming (i.e., people had heard of it) had increased to something like 90% of survey respondents by the 1990s, a 2002 Gallup poll in the US showed that only 61% of respondents *believed* the phenomenon was actually occurring. They concluded that this reflected a limited understanding of particular causes, possible consequences, and solutions amongst the general public.

A strong hypothesis advanced by Australian researchers such as Hamilton (2001, 2006), Pearse (2007), and Beder (2000), who have looked closely at the trajectory of events and the policy process, is that this confusion and uncertainty by 2002 is at least partly due to deliberate campaigns waged through politics and media, to sow doubt, and deliberately to exploit and broaden uncertainty, and indeed to provide misleading "science" to the public. There is evidence for this, canvassed later in this thesis, and the question I try to expand on is how exactly this relates to the manner in which climate

change science was communicated over time. Why is this important for communicators and policy-makers? The literature also suggests that:

> These basic misperceptions are likely to inhibit the public's ability to participate meaningfully in the democratic discussion about the issue, to understand how their own actions affect the climate and to fully and accurately appreciate how climate change will affect our future. (Lowe et al., 2006, p. 437, quoting Seacrest 2006, p. 261)

Lowe et al. (2006) also cite research that underscores the even more fraught nature of public understanding about *rapid* climate change and, one can add, extreme events. Rapid climate change is becoming clearer and more "real" as scientists delve into the issue, but there are still many uncertainties about specific future events (Weart, 2003; IPCC reports 1990-2007). Lowe et al. found that there is little research on this subject overall. A related area that has received little research attention is the nature of public understanding of anomalous weather events, such as colder weather in the northern hemisphere and unexpectedly at times in Australia. I suggest that this heightens uncertainty for those who have accepted the concept of "global warming" rather than more broadly "climate change", or those who are inclined to deny the phenomenon altogether.

Poll Data from Late 1980s on

If one looks at some published public opinion polls in Australia and the US it appears that public understanding diminished as the 1990s progressed from a highpoint around the late 1980s—and the question that occupies this thesis is: Why?

A September 1988 opinion poll reported in the *Sydney Morning Herald* began with the following headline and lead: "Most want action over the greenhouse effect. Three-quarters of Australians are troubled by the environment-threatening greenhouse effect and believe something must be done to halt it, the latest Saulwick Herald Poll shows" (Carney, 1988, p. 5).

What happened between 1991 and 2001? If one accepts overseas studies as proxy data, some interesting trends and statistics emerge from a 2007 analysis of 20 years of poll results in the US (Nisbet & Myers, 2007). They found that there was an upswing in public awareness following record heat events in 1988 with related media attention—reported public awareness jumped almost 20% from two years earlier. But a low public awareness response, just 7%, was recorded by November 1997—a month before the Kyoto conference—suggesting that the politics of climate change had not necessarily engaged the public.

Between 1994 and 2000, poll data hardly shifted on the percentage of respondents (57% down to 54%) who confused the greenhouse effect with the hole in the ozone layer—implying perhaps that there was little effective science communication during this period. Nevertheless, the authors found what they call a "strong majority" (which breaks down to >50%) of the public believed throughout the survey period (i.e., from the 1980s on) that global warming is real, that temperatures are rising and that the release of carbon dioxide is a cause. This might imply that at any given time at least half the public has not been influenced by the dominant and changing political–media narrative that I postulate in this thesis—or perhaps that "belief", understanding, and will-to-action must be closely defined as far as opinion surveys are concerned.

The numbers declined from 68% who answered in the affirmative that global warming was real in 1992 to 57% by 1994, and the authors here also suggested (Nisbet & Myers, 2007, p. 450) that this may be due to strategic communication efforts from conservative think tanks boosting scepticism. Also significantly for the evidence gathered for this thesis, from the mid-1990s to 2004, only 30–40 % of the public believed scientists were in agreement about scientific consensus or in agreement about climate change. I suggest that the application of scientific "balance" in the media, denialist rhetoric by politicians, and sceptic framing came to be quite effective in burying the previous consensus in understanding.

A more general decline in interest in environmental issues was another factor in the poll data. A 2006 survey by the Australian Bureau of Statistics (ABS) reported that, in Australia, there was a general falling off of concern for environmental issues after 1992, when 75% of Australians expressed interest. By 2004, the figure had dropped to 57%, with young people (aged 18–24) the least concerned. Almost 80% of young people said

they cared about the environment in 1992. The change in concern during the following decade could be interpreted as a consequence of national and state leadership focus on the economy to the exclusion of the environment after 1992, and possibly the reactionary stances of environmental groups during the later 1990s and early 2000s, that is, reacting rather than leading (Beeby, 2006).

Linking Agenda-setting and Public Understanding

In the previous chapter I have postulated that establishing a dominant narrative of "what we think" by elite agenda-setters in politics and the media is a key framing device to be examined.

However, the literature review shows that most of the relevant public understanding, media, and sociological studies do not make an explicit link with policy and political studies in order to explore how public understanding of the scientific information is correlated with changing policy and with media structures. To do so would arguably be a fruitful way to understand how these sectors set the national discourse, and that is the approach taken in this thesis. Lowe et al. (2006), in reviewing the available literature to that date, found that there is limited knowledge or synthesis of the science and society forces that shape public knowledge on climate change.

No work is available on the Australian experience that links science communication or public understanding analysis with media and political analysis to determine how environmental discourse agendas are set. This leaves a gap that may be filled by multidisciplinary studies. In the interim, overseas literature can be relevant to the Australian experience because of the global nature of media companies operating in Western English-speaking democracies, and similarities in policy formation and public discourse.

Thus, Lorenzoni shed some light by reporting that British focus groups thought the obligation falls on politicians to "do something", since they have wider scope for action, and that the issue has been successfully framed as one of "far-off" consequences (Lowe et al., 2006, citing Lorenzoni, 2003). Australian research (e.g., Johnson 1987; Wheelwright & Buckley, 1987) says this country also has the tendency to elect people and expect them get on with it.

In their comprehensive review of the international literature on public understanding of communicating climate change up to 2002, Corbett & Durfee (2004) pinpointed a recurring theme: that media stories and related public understanding on climate change during the 1990s were driven by "sources"—whether scientist or politician—who would "frame" events from their particular perspectives or agendas. The means for this communication tended to centre on conferences, IPCC reports, or by highlighting dramatic events (the weather), rather than by consistent communication of the inherent risk.

US researchers Corbett & Durfee (2004) and Boykoff & Boykoff (2004) have fashioned experiments to demonstrate that the way in which science information is presented (whether it involves context, balance, or representations of certainty or understanding emerging from the scientific process) influences public understanding—particularly of certainty. For example, in their media experiment to gauge understanding amongst readers, Corbett and Durfee found that adding context to an article provides the greatest degree of certainty to the reader. In terms of the climate change story this means putting a scientific report in the context of the body of evidence over time. Boykoff and Boykoff showed through media analysis that the prevalent practice of "balancing" opposing scientific views, out of context, biased the public discourse to uncertainty.

An attempt at summarising citizen attitudes was reported by Lowe et al. (2006) in light of perceived uncertainty. A 2000–2003 study by Lorenzoni of British attitudes (in the time period immediately following the period of interest of this project) could be subdivided into four categories: those who *deny* that humans affect climate change and feel that it is not important; those who *doubt* that humans affect climate change but think the issue is important; those who *agree that humans are responsible* but think the issue is not important; and an *engaged* group who think both that humans are responsible and that it is an important issue.

In regard to changing social reality over time, German social researchers explored the idea that public understanding of a scientific issue, specifically climate change, can change in response to the social or political context (Weingart, Engels & Pansegrau, 2000). They called it "patterns of communication disturbance" or communication noise, and it can undo a consensus.

Building on some of these understandings, there is scope for much additional work to be conducted on both quantitative and qualitative aspects of the public understanding of the climate change phenomenon in Australia, as well as the cultural values that shape this understanding. With the benefit of earlier international research in public understanding and also the insights from other disciplines that allowed me to develop a framing lens and a research context, I began analysing the trajectory of Australian climate change communication from 1987–2001.

AUSTRALIA'S PUBLIC KNOWLEDGE OF "THE GREENHOUSE EFFECT" IN LATE 1980s

Public knowledge[6] of climate change received little research attention in Australia after the early 1990s. Before that time, a significant attempt at understanding the country's level of knowledge and understanding came to a startling conclusion. In their 1989 book, following two CSIRO-coordinated "greenhouse effect" conferences and public fora staged in 1987 and 1988, earth scientist Ann Henderson-Sellers and her co-author Russell Blong reported on the outcomes of a two-year media and public awareness campaign. They felt able to claim that "the awareness of the greenhouse issue is probably greater amongst the general public in Australia than in any other country in the world" (Henderson-Sellers & Blong, 1989, p. 155).

This begs the question I attempt to address from a communications perspective: What interfered with this public awareness during the following decade?

Henderson-Sellers and Blong used a questionnaire survey method that looked at three areas of public perception or awareness: how much of the science the public understood; what level of confidence or certainty they expected from scientists themselves; and how convinced they were of the truth of the "greenhouse effect" (as it was then universally called).

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[6] In this work I use public understanding, public knowledge, and public awareness and perception interchangeably to denote the public discourse and, to the extent it is measured, the state of public understanding of the science of climate change/greenhouse effect/global warming.

A large majority of respondents worried that a policy response to the greenhouse effect would advocate nuclear power; respondents did understand the link between greenhouse effect action and lower use of fossil fuels, and they worried about higher temperatures and rising sea levels. People expressed a lack of scientific understanding but wanted to know. Perhaps most interesting in regard to the 1990s sceptic debate and related discourses of uncertainty, was that a majority of respondents demanded only 50–70% certainty from scientists before action was justified.

This raises the further question: Did atmospheric scientists themselves appreciate this as they took cover from the sceptic barrage, and by the second IPCC report in 1995 changed their public communication to more defensive language highlighting uncertainties? That this change was deliberately instituted at the IPCC level by the mid-1990s was confirmed by leading US atmospheric scientist Stephen Schneider in an interview for this project in 2007 and is discussed further in chapter 9. The intent may have been scientific method and accuracy, but the effect was possibly to encourage a lay expectation that somehow 100% certainty could be achieved by calling a 95% certainty merely "very likely".

The language in the first IPCC report in 1990 was plain English and definite, and sets a communication benchmark that is commonly overlooked in research discussions of IPCC reports; therefore I examine it more closely in chapter 9. In the world of science and policy, the 1990 IPCC report may, in hindsight, be regarded as a refreshing anomaly. Henderson-Sellers and Blong report that mainstream scientists exhibiting conventions of scientific caution was already apparent in 1989, and that this may be a micro cultural phenomenon. They state that at a public presentation "Considerable surprise was expressed that scientists should be vehemently debating small differences of certainty ranging from 95–99%" (Henderson-Sellers & Blong, 1989, p. 166).

Another interesting finding from these early days points to quite sophisticated public understanding. Henderson-Sellers and Blong asked whether people felt there was any attempt from any sector to deliberately confuse the scientific issue. Twenty-nine per cent of respondents thought so. The respondents thought journalists and politicians were largely to blame, while scientists were seen as somewhat responsible but not very. Other agents of confusion nominated were multinational corporations (self-interest) and extreme environmentalists (propaganda). Respondents to the surveys were overall

probably a more informed demographic than an average "person on the street" poll. Professionals who worked in planning or teaching or policy, plus some meteorologists, predominated. They were selected from those that attended public events of Greenhouse '88. The authors conclude that all those surveyed, including high school students, correctly understood the scientific message, while interpreting the response of politicians and planners as ineffectual and possibly uncaring. The young people were described as seeing an unsatisfactory future, but not a way to change the outlook.

Two state surveys of Australian public attitudes that were published in 1989 come from the Electricity Commission of New South Wales and the Victorian Government's electricity commission, and are evidence that states at that time were somewhat serious about containing consumer demand for coal-fired electricity. Concern about cutting down forests, the hole in the ozone layer, and the greenhouse effect were most frequently mentioned as top world environmental problems. In the NSW survey, conducted by the Roy Morgan Research Centre, 95% of respondents had heard the term "greenhouse effect" and 41% knew it was warming the earth, although an almost equal number confused it with ozone layer depletion. Respondents nominated running a car, burning coal, and logging forests as primary causes (along with the ozone-depleting aerosols). People also expressed themselves willing to pay more to have a large impact on emission reductions (Morgan, 1989).

A December, 1989 Victorian survey was a small, self-selected sample in response to a discussion paper on alternative responses to "the greenhouse challenge". *The SEC and the Greenhouse Effect* found that respondents were in favour of an even stronger target for emission reduction than 20%; people understood the benefits of efficiency measures, and said coal-fired electricity should not be promoted for home heating and hot water heating in preference to gas and solar. Renewable energy was supported and respondents said hidden subsidies to status quo industries should be removed. Tree-planting programs were strongly supported. Respondents even pointed out the severe conflict between wanting to attract energy-intensive industries with cheap coal-fired electricity and, on the other hand, reducing CO_2 emissions. People noted that alternative jobs could be created with clean-power industries, (a theme still struck by some labour unions in recent years) (State Electricity Commission, 1989).

A later glimpse of public awareness in Australia is provided by British geographer Harriet Bulkeley. Her late 1990s study of public attitudes in Newcastle, New South Wales, concludes that barriers to effective action are institutional rather than a lack *per se* of public understanding or information. She found that the level of public involvement is related to not only information, but also people's sense of moral responsibility, local knowledge and values, and the level of government and industry support. Bulkeley wrote: "These findings suggest that rather than focus on the provision of information, policy attention should be directed to the social and institutional barriers that act to constrain public involvement in addressing global environmental issues" (Bulkeley, 2000, abstract).

EVIDENCE OF PUBLIC KNOWLEDGE AND FOCUS ON RISK

Early Popular Science Books on the Greenhouse Effect

The evidence gathered for this thesis sheds some light on how the late 1980s consensus was established and how extensive the communication was. From a communication perspective, the public discourse was informed by a range of material from books to government documents, and a steady stream of media articles relaying a fairly uniform message about risks posed by climate change.

For example, books published in 1989, taken together, leave no doubt about the considerable knowledge of climate change that was available to the public 20 years ago. Besides the Henderson-Sellers and Blong offering outlined above, another of four books on the subject published that year was by two English authors—one a conservation campaigner and the other a journalist for the *Guardian* newspaper.

Stewart Boyle and John Ardill (1989) wrote about climate change with uncommon style and understanding of what people "hear", or relate to, like weather analyses:

> Many of 1988's droughts and floods, heat waves and hurricanes were random events, the roll of the dice. But the dice are being weighted. In coming years they will fall hot and stormy-side uppermost more often. Hard-nosed politicians with voters to cosset, powerful vested interests to satisfy and rivals to guard

> against began to talk like prophets, ecologists and utopians … they began to talk of a world that is frugal and fair. (p. 4)

Boyle and Ardill reported that, at the time, politicians appeared to have achieved a "glimmer of visions" and that this was framed in language that spoke of solidarity, equity, and accountability—in other words, an ethical framework—rather than the tyranny of the immediate. And they put this unusual political focus within the context of worldwide weather catastrophes that marked 1988.

> In 1988 the atmosphere came within one percent certainty of proving that humanity has upset its natural balance and that it will strike back blindly and with catastrophic unpredictability. Global warming is the threat that bundles up all our woes into one problem and one solution. (Boyle & Ardill, 1989, p. 5)

Other significant books were written by Fred Pearce, a long-time environmental correspondent for *New Scientist* (Pearce, 1989) and by physicist Ian Lowe, who was at the time Acting Director for the Commission for the Future and a faculty member of the Science Policy Research Centre at Griffith University. Lowe wrote for a lay audience to summarise the science and policy understanding of 1988–1989 following two seminal greenhouse conferences, and after encountering tremendous public interest in the subject (Lowe, 1989).

The books from this period challenge any notion of an incremental, one-way path towards greater political and public understanding over the course of the next 20 years (to the present). For example, Boyle and Ardill quote Mostafa Tolba, then Executive Director of United Nations Environment Programme (UNEP) who said, "Political leaders now accept the broad scientific consensus that human activity is altering climate and that the changes and their impacts will become more pronounced over the next few decades" (Boyle & Ardill, 1989, p. 6).

Together with other documents, these books provide a science history perspective of events, understandings, and values that characterised the English-speaking world, and Australia's climate change knowledge and response in the late 1980s. Before moving on to an exploration of the Australian policy framework and shifting response to the science during the 1990s, it is valuable to look in even more detail at the public

knowledge of the late 1980s, thereby establishing a science and society baseline comparison for later events.

A Baseline of Understanding

Lowe's 1989 book *Living in the Greenhouse* was followed in the mid-1990s by *Living in a Hothouse* (the latter out of print and not accessed). The first book offers a compendium of what was known at the time on climate change—its risks and solutions—in notable contrast to discourses that developed through the mid-1990s and into the present. Together with other documentary evidence from the period uncovered by this thesis project, it supports the claim for Australians' high level of public knowledge at the time found by Henderson-Sellers' and Blong's survey.

There is arguably no more consistent observer and science writer about climate change on the Australian scene than Lowe who, first as an academic and, since retirement, as President of the Australian Conservation Foundation, has documented and spoken "truth to power" for 20 years—and for even longer has studied the science and society story revolving around the changing atmosphere.[7]

In 1989 Lowe was Acting Director of the Commission for the Future, established in 1986 by then Science Minister Barry Jones, to provide a "think tank" environment, and a public awareness forum for science and innovation developments. The Commission disappeared in the early 1990s, along with other structures from the Hawke Labor government (Jones, 2006; Lowe, 1989). So what does Lowe's (now historical) book refer to? What language does it use? And how is it buttressed by other contemporary evidence?

Readers may first wish to refer to the chronology of science discoveries and events in Table 2 following this chapter. Lowe first sketches a quick science background, starting with the revelation that the theory of the "greenhouse effect"—i.e., that increasing carbon dioxide, methane, and other warming gases in the atmosphere might alter the

[7] Several other Australian scientists/technologists from this era, who have continued to publish for a lay audience and have disputed prevailing economic ideologies driving responses to climate science during the 1990s, include Mark Diesendorf and Alan Pears, whose books and interview material have helped inform this thesis. This is in addition to atmospheric scientists—CSIRO's Barrie Pittock, Willem Bouma, Graeme Pearman, and Michael Raupach *inter alia*—who have spoken in many public fora and published for decades on this subject, and also provided major insights for this project.

climate—is more than 100 years old. It was named by the Swedish chemist Svante Arrhenius around 1896. The natural "greenhouse effect" balance of gases has been beneficial in keeping the earth warm and habitable. But:

> Our contemporary problem is that human actions since the Industrial Revolution have been changing the composition of the atmosphere … the scientific community has been concerned for several decades. By the 1950s it was suggested that the rate of burning fuels such as coal could be changing the amount of carbon dioxide in the atmosphere. (Lowe, 1989, p. 1)

Language and issues documented from the Lowe book and by other authors or researchers cited as evidence in this chapter, and also language and content of government documents, reflect media and public discourse framing from this period. The language used by Lowe in the paragraph above is typical of the way the "greenhouse effect" was described during this period: matter-of-fact, declarative language, and clearly linking atmospheric pollution and human actions. The descriptions from this period assume that the chemistry underpinning the science is basic and easy to understand. Lowe notes upward trends of coal burning globally [from 1.5 million tonnes annually in the 1920s to an estimated 20,000 million tonnes 60–70 years later years later,] and the simple chemistry of burning carbon + oxygen = carbon dioxide. As early as 1980 the Australian Academy of Science organised a conference in Canberra to review the thinking of leading scientists on the issue. Lowe says "It was noted then that carbon dioxide levels were increasing quite rapidly and it was estimated that the pre-industrial level could be doubled by the year 2030" (Lowe, 1989, p. 2).

Global Ethical Approach and Early Policy

A global, ethical approach to dealing with the industrial pollutants threatening to cause climate change was used by politicians in the early study period according to authors like Boyle and Ardill (1989) and McDonald (2005) who analysed values reflected in the politics during the study period. This definite and ethical approach is highlighted in a speech given by Margaret Thatcher to the United Nations in 1989 and is quoted at some length in the next chapter.

In regard to the known science, the authors writing in 1989 were aware of atmospheric modelling work also outlined in the 1990 IPCC report suggesting temperature increases of 1–2°C near the equator and 4–6°C at higher latitudes within the 21st century under "business as usual" scenarios and these predictions have hardly changed. (By the mid-1980s the world was experiencing a 0.5°C average increase). Looking back, Lowe said in 2007, "We've known for 20 years the impacts but we underestimated the speed of change; numbers have changed remarkably little. Climate change is happening a little faster" (I. Lowe, thesis interview, April, 2007).

Affecting the public discourse in the late 1980s, however, was the fact that while scientists painted the macro effects—such as sea-level rise; and changing, extreme, and unpredictable weather events—with mostly confident strokes, they could not be specific about local and regional effects. Lowe and others commented at the time on some scientists' qualifying language stressing uncertainty, possibly in response to these unknowns, but the qualified language was sending signals not easily understood by politicians or the media, as will be discussed more fully in chapter 9.

Confidence of Scientific Communication

However, other aspects of the documentary record, such as newspaper reports reviewed for this thesis, indicate that in the early study period the public language of scientists did signal unambiguous confidence that the greenhouse effect was a real phenomenon caused by human activities. A review of 25 stories sampled in *The Sydney Morning Herald* for half of 1988–1989 showed most of them quoted scientists in a global context that involved Australia, that is, many of the reports quoted US scientists. Potential consequences were at that time openly discussed by government scientists and technologists. For example this article quoted Australian scientists, with the headline "Scientists warn of islands' peril":

> Australia may need to take in a wave of environmental refugees from coral atolls in the Pacific and Indian oceans, according to two scientists. The islands' inhabitants face being displaced by a likely rise in sea level due to the greenhouse effect, they say. The prospect was raised yesterday at the 26th Congress of International Geographical Union in Sydney by Dr Peter Roy, of the NSW Department of Mineral Resources, and Dr

> John Connell, of the University of Sydney. Up to about 500,000 people living on small coral islands in the two oceans could be displaced if the predictions of a one-metre rise in sea level over the next 50 years prove correct. (Quiddington, 1988, p. 7)

Looking back in 1993, Henderson-Sellers credited scientists and clear communication with prompting policy action:

> Clear statements of scientific confidence in the greenhouse phenomenon in the mid-1980s prompted demands of policy, and hence for policy awareness. In Australia, as in many other countries, public and political awareness of the possibility of greenhouse-induced climate change increased (Henderson-Sellers, 1993, abstract).

The evidence shows that early framing of anthropogenic climate change science information by scientists and media communicators did deliberately or instinctively address what lay audiences (be they politicians, media, or the public) were likely to "hear" from their own past experience. They used the language of risk, or current weather events, or likely impacts such as sea-level rises. There was early acknowledgement that a 60% or more global reduction in emissions was the necessary response and a matter-of-fact assumption therefore that a strong response was required in the public interest.

Thus, reflecting the science–policy interface at this time the Chairman of the CSIRO, Neville Wran, told *The Australian Financial Review* in 1988 that regulation might be needed to achieve emission cuts. "The Federal government may have to bring in laws to control the greenhouse effect … legislation would be required to either recognise international agreements on controlling the greenhouse effect or to regulate the phenomenon in Australia" (McKanna, 1988, p. 4).

Government Documents and Early Public Knowledge

A review of government documents from the early study period provides further evidence for the level of public knowledge exhibited by government officials and agencies, and acceptance of the science as described at the time. A senate inquiry in

December 1989 is typical of the language and framing of the time, and is worth quoting in detail for comparison with later and even recent discourse. This inquiry was briefed to look at the contribution that Australian science and technology could make to combat the greenhouse effect.

The Senate Standing Committee reported that it met with: Director of the Bureau of Meteorology, Dr John Zillman; senior research scientist from the CSIRO Division of Atmospheric Research, Dr Graeme Pearman; Acting Director for the Commission of the Future, Professor Ian Lowe; and a senior officer from DASETT, Mr Nelson Quinn. The report accepted the science of the physics and chemistry, the predicted impacts for Australia, the risks, and the moral obligation as a global citizen—as shown in the following extracts from the introduction (Commonwealth, 1989a). . [My emphasis in italics]

> The experts with whom the Committee met confirmed that there is *irrefutable scientific evidence* that the composition of the atmosphere has been, and continues to be, altered significantly by human activities…[discusses ice core evidence in particular] … "The changes that are likely to occur as a result of these changes in the atmosphere cannot yet be predicted precisely. However, the scientists *predict with a high degree of confidence* that a global warming of between 1.5 and 4.5 degrees centigrade can be expected to occur by 2030. Climatic records indicate that this warming may already be happening. This phenomenon is popularly known as the greenhouse effect

On likely impacts the report stated:

> The sea level can be expected to rise between 0.2 and 1.6 metres, as the oceans become warmer and expand. There will be changes to the climate … In Australia the prevailing weather patterns are expected to move south. Some areas will receive more rain but it can be expected that droughts will become more frequent in other areas, and that climatic extremes such as cyclones will occur as far south as Brisbane.
>
> There is a risk that *if the response to this problem is delayed until the evidence of significant climatic change becomes irrefutable*, it may be too late to avoid

> some of the more extreme changes that could occur …Early *action is essential* to stop or slow some of the more extreme effects …

This document shows that the political framing was moral and sought opportunity. Since our per capita emissions are large, "we would not be in a position to seek change elsewhere unless change is implemented here". The document said Australia should "serve as an example" and "develop industrial techniques and innovations" (Commonwealth, 1989a).

Six months earlier, in July 1989, Prime Minister Hawke said the following in his Statement on the Environment:

> The growing consensus amongst scientists is that there is a strong possibility of global warming with major climate change, and that this is linked with the levels and nature of industrial and agricultural activity. Significant climate change … would have major ramifications for human survival …" (Hawke, 1989, p. 28)

Earlier still, federal Environment Minister Graham Richardson concurred in a *Sydney Morning Herald* interview, calling the greenhouse effect the greatest threat facing Australia and the world (Seccombe, 1988).

Temperature Penalty for "Business as Usual"

The evidence in these documents indicate that politicians and their advisers at that time were establishing a dominant narrative frame for early intervention, as a global good citizen open to regulation for the common good—which remained a rhetorical goal at the time of Australia's participation in the UN Framing Convention on Climate Change 1992. Also known to policy-makers at the time was the 1990 IPCC assessment of the cost of inaction or sticking with the status quo: 0.7°C of additional warming by 2010 (Commonwealth, 1992, citing IPCC, 1990), illustrated as the blue curve in Figure 6. CSIRO scientists were also writing about the temperature effect of delayed action in the early 1990s, e.g., Pittock and Enting, 1993.

Figure 6 Consequences of delayed emission reduction

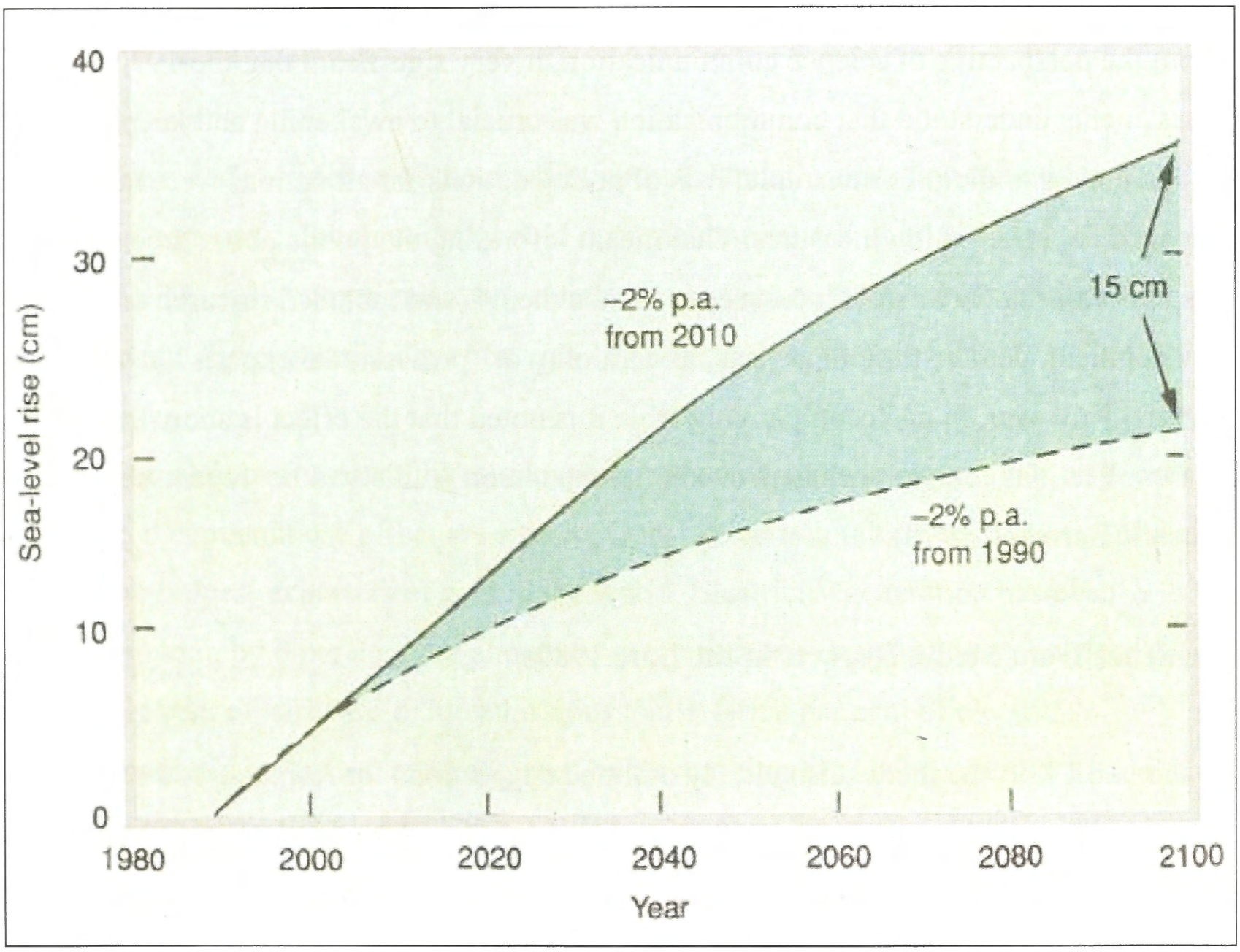

Figure 6. *"Warming to the year 2100 is shown for two scenarios: 2% reduction per annum in greenhouse gas emissions starting in 1990, or 20 years later in 2010. The difference is the 'temperature penalty' for delaying reductions." Source: IPCC, 1990, in* Grappling with Greenhouse – National Greenhouse Advisory Committee, CSIRO Publications 1992, p.40.

However, mitigating the risks was also recognized early on as a major undertaking. The 1990 IPCC report on response strategies warned that "Achieving a 20 percent reduction from current emission levels would require major changes in global energy markets, plans and infrastructure and intervention by governments" (Bernthal, 1990, pp. 66–67). A 1989 report from the Australian Prime Minister's Science Council noted that reaching this same target would call for "deep-reaching and pervasive energy-restructuring at

considerable cost and substantial government intervention" (Kolm and Walker 1989, p. 147) foreshadowing major barriers that would be erected to action in the next decade: that is, the cost barrier, the power of the status quo and the ideological dislike for regulation.

Recognition of Communication Role

From the perspective of science communication, it very significant that the 1990 IPCC assessments understood that communication was crucial to awakening and keeping public understanding. For example, lists of policy options for all nations were headed by the need for information measures. That meant informing the public about greenhouse gas emissions and available measures to reduce them—and included research and development, demonstration projects, and training of "professional experts" in all sectors. However, in an accompanying table it is noted that the effect is short-lived. This has implications for what has happened (and the lesson is likely to be: repeat, repeat, repeat) (Bernthal, 1990).

Evidence from Media Reports in the Late 1980s

In the late 1980s the media also clearly outlined suggestions for response and conducted an open discussion about the state of Australian fossil fuel-based industries. Solutions were headed by energy conservation and referred to fuel conversion (to gas), renewables, and related jobs. The following article sampled from the *The Australian Financial Review* (Fin Review) discusses the federal government's push for energy efficiency as a response, and quotes sources saying Australian industry is extremely wasteful in its use of energy:

> … ignoring even simple energy-saving projects that would have a payback time of less than one or two years. The study found that energy consumption and greenhouse gas emissions could be cut by 15 per cent using easily identifiable energy savings that would actually make rather than cost money.
>
> …
>
> The bigger picture is that the industrial sector contributes 36 per cent of all Australian emissions of carbon dioxide, the main gas associated with the greenhouse effect. A national target of a 20 per cent cut in emissions by the year

> 2005 is thought likely to be adopted in the near future. If this is to be achieved, then industry is going to have to show it is taking the problem far more seriously. Otherwise it will only be inviting the Government to force it to take action (Roberts, 1989, p. 17).

In other words, it was recognised in 1989 (and in the business media) that halving emissions from an inefficient industry sector would get Australia a long way towards its target of 20% cut in emissions.

There is also early evidence of the conflict with Australia's emerging minerals extraction economic direction that would come to dominate in the 1990s (discussed in chapter 5). The following Fin Review article shows the conflict between emission reduction and the economic direction was apparent at this early time.

> The reasons for Australia's awkward position on global preventative responses to the greenhouse effect are simple. Ours is a carbon intensive economy. We are the biggest exporters of coal in the world. Electricity generation has been growing by 6 per cent per annum over the past two decades, to account for 44 per cent of carbon dioxide emissions. Ninety-five per cent of electricity produced in Australia is generated by the burning of fossil fuels such as coal and gas.
>
> Per capita, Australians are the fifth highest greenhouse polluters in the world behind the United States, East Germany, Canada and Czechoslovakia. Australians produce an annual average of four tonnes of carbon dioxide each, compared to the world average of around one tonne. We are the third highest per capita users of automotive fuel.
>
> Moreover, to trade out of its foreign debt burden, Australia hopes to do much more processing of raw materials in the 1990s. Like the wave of aluminium smelting investment of the early 1980s, this would be energy intensive—and thus greenhouse intensive—stuff. (Stutchbury, 1990, p. 16)

This discussion foreshadowed that Australia's minerals and smelting sector would become a driving force for the argument that Australia had a "special case" not to make

changes or significantly lower greenhouse gases—an inefficient sector that was very sensitive to increases in the price of electricity if it wanted to remain competitive on the world stage. A further exploration shows that a succession of Australian policy-makers and industry lobbyists during the 1990s decided to keep the status quo as it was then, and instead change the framing of the public discourse to suit that goal.

A related framing was evident by November 1989 when it was reported that the Treasury under Paul Keating—in an internal argument about emission reduction targets—was advocating the position that Australia could increase its pollution as a specialist energy user.

> Senator Richardson wanted to set a 20 per cent reduction target by the year 2005 but was defeated by the intervention of the Treasurer, Mr Keating. The Treasurer convinced Cabinet that Australia should instead promote itself as an energy-efficient industrial centre. The argument was that while pollution might increase in Australia, there would be an overall reduction worldwide. (Dunn, 1989, p. 8)

The articles by Stutchbury and Dunn sampled from the Fin Review illustrate the more neutral and sometimes critical reporting about energy-intensive industries in the early study period compared to a more partisan pro-industry narrative by the mid 1990s shown in material presented as evidence in chapter 7.

Weather Framed Risk

The compelling narrative in the late 1980s and early 1990s was often anchored by the observation that the weather was getting hotter with droughts, heatwaves, and changing rainfall patterns around the world. This was gaining public attention.

Media stories sampled for this project from the period bear this out, as do the books from 1989 mentioned above. A review of articles from *The Sydney Morning Herald* (SMH) for 1988–1989 shows 118 mentioned greenhouse effect, global warming, or climate change in the title or lead paragraph (out of 353 that mention these words somewhere). A similar analysis for the Fin Review yielded 56 articles out of 184 for this two-year period that headlined the phenomenon. Many noted the droughts and heatwaves affecting the planet at the time. If one accepts the finding that most people

receive their science information and therefore public understanding via the media, these figures demonstrate a significant public discourse at that time.

For example, consider this 1988 article in the Fin Review, aptly titled "Government Officials Start to Feel the Climate of Change":[8]

> … yesterday, Queensland's Water Resources Minister, Mr Don Neal, was at the forefront of the discussion. He pointed out the possible economic impact on Governments from increased flooding, more severe droughts, the effect on agricultural and pastoral industries and the need to redefine engineering design codes for roads, bridges, railways, dams and even housing … "There is no longer any serious doubt that climate will change more rapidly over the next 50 years than ever before in natural history". (Massey, 1988, p. 28)

Risk messages were the frame for the expected weather changes. Books and articles from this period, and government reports, provided detailed discussion from the proxy record (as well as historical records) and modelling data of a climate scenario for Australia in coming decades—outlining risks, and likely short and longer-term impacts including: temperature rise (tropical cyclones); changes in average rainfall and intensity (floods); sea-level rise (landslides); droughts (wildfires); and land degradation and health consequences. New data have *refined* regional detail of risks, but the record shows they were there in the early study period. (For example, see Appendix 1 for"Planning Ministers' Greenhouse Seminar, Cairns, June 1990".)

A federal environment department (DASETT) briefing minute to the CSIRO Division of Atmospheric Research shows that the federal government bureaucracy understood that "risk management was necessary" and that "action needs to be taken now" ("Climate Change due to the Greenhouse Effect," 1987, item vi). The document speaks of more extreme events and erratic weather. The language—urging action despite scientific uncertainties on specifics, but based on a clear understanding of the risk posed by anthropogenic influences and the "greenhouse effect"—is evident in numerous other government documents published between 1987 and 1991. Some examples are listed in Appendix 1 along with some sample media reports from the period.

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[8] Given 2010–2011 weather events in Queensland, this historical record becomes even more interesting.

In summary, the science messages in the late 1980s and early 1990s were framed as matter-of-fact findings and reports on risk, affecting *all* sectors of society. The clear science frames were supported by political calls for early action, emission reduction targets, and agendas for mitigation responses. Yet, within 10 years these messages had been reframed into a hazy "scientific debate" characterised by uncertainty, which confused the public and blocked action.

In 1989, with the weather giving warning signs, and media plus political leadership on board, the documentary evidence might lead one to assume that appropriate action would follow step by step. And so it did—on paper. But even at that early and active stage, Lowe was cautious about the length of time it might take for effective global action. He compared the social response to the slow trajectory of action on the ozone hole between 1974, when discovery of damage by chlorofluorocarbons was made, and 1987 (13 years later) when degeneration of the ozone layer became measurable. The ozone story was also instructive about communication and the internal issues within the scientific community regarding empirical evidence. "For 13 years those who wanted to do nothing could stall by saying the evidence is not good enough, only *measurement* is evidence that warrants action" (I. Lowe, thesis interview, April, 2007).[9]

Science Events and Early Public Understanding

The history of climate change understanding in Australia and overseas was led by scientists with conferences and major public events in the early study period and, as this chapter documents, it was effective. European environmental journalist Fiona Harvey told the (US) Society of Environmental Journalists in 2006: "When people first heard about global warming, it wasn't from politicians, it was from scientists through the media. So we got the scientific view before any politics got attached to it" (Harvey, quoted by Thacker, 2006). US media research by Wilson (2000) concluded, similarly to the findings of this thesis, that media stories peaked between 1988 and the early 1990s, and that scientists were a primary source of information during the early study period. Wilson's informants—environmental journalists—indicated that media coverage picked up again around 1997 when the Kyoto Protocol was under discussion.

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[9] Ungar (2000) found the ozone story had also yielded some other interesting communication lessons. Despite similar sceptic and industry attacks, Ungar found the ozone hole risk enjoyed the advantages of being easily described with a metaphor (a hole in the earth's protective shield); it denoted a hot crisis (skin cancer risk) and there was a comparatively simple solution to hand.

Lowe (1989) and others credit the 1985 United Nations Environment Programme conference at Villach, Austria, with putting global warming/climate change on the public agenda. The conference made significant risk pronouncements linking anthropogenic (human-originated) increases in greenhouse gases with global warming and climate change, and marked a consensus within the climate science community that "we have a problem", (Bolin et al., 1986; Bouma, Pearman & Manning, 1996). See Appendix 1 for full statement.

Villach was followed in 1987 by the international agreement to ban ozone-depleting substances, the Montreal Protocol. This demonstrated that countries *could* come together based on scientific advice although there is evidence that the two issues—the hole in the ozone layer and greenhouse gas pollution—became confused in the public's mind. In 1988 the Intergovernmental Panel on Climate Change (IPCC) was formed by the UN and the World Meteorological Organisation. There was also a landmark greenhouse conference held that year in Toronto, Canada, that drew 330 scientists and politicians from 46 countries to discuss the changing atmosphere of the Earth. This conference led to a "call for action" on global targets to lower greenhouse gas emissions by 20% below 1988 levels by 2005—similar to the model for decreasing emissions that were widening the hole in the ozone layer. These global targets would be adopted by Australia two years later.

By that time, politicians were being called to join. Lowe quotes then CSIRO senior atmospheric scientist, Graeme Pearman, calling the evidence facing this first global conference of concerned scientists and bureaucrats a "clarion call to politicians to take action" (Lowe, 1989, p. 4). Pearman who, throughout the late 1980s and 1990s, was active as a science communicator on climate change (G. Pearman, thesis interview, June, 2006), later became Division Chief and was co-vice chair of the 1990 IPCC science working group.

It may surprise those who think that the scientific evidence was thin at that time, to hear that the Villach Statement in 1985 reflected conclusions drawn from much recent research (Lowe, 1989), ranging from ice-core evidence to analysis of atmospheric chemicals, experiments with general circulation models, and observations on heat and sea-level rise.

A BRIEF OPEN DOOR OF OPPORTUNITY IN AUSTRALIA

The 1990s political changes that would bury Australia's early climate change response strategy make the events of the late 1980s all the more remarkable in hindsight. Early public understanding arguably reached its apex as the CSIRO, along with the federal government, developed the first two national greenhouse conferences as public awareness vehicles—featuring Australian climate change science that was of international standing. The conferences garnered widespread media and community attention.

The December 1987 conference, Greenhouse '87, was primarily a meeting of scientific experts who were given a baseline that climate change would happen and were asked to analyse the most likely impacts and scenarios (Bouma, Pearman & Manning, 1996; Lowe, 1989). "The conference attracted considerable media interest, with the main emphasis, perhaps predictably, being on the worst cases of gloom and doom: coastal land possibly flooded, agricultural areas possibly turned to desert, cyclones possibly moving further south, and so on," (Lowe, 1989, p. 4). This media appetite for the most dramatic possibilities may have had ramifications in following years as scientists themselves started drawing back from being associated with such black and white predictions and the definitive language that characterised the first (1990) IPCC report.

At the time, a 750-page volume, *Greenhouse: Planning for Climate Change*, edited by Pearman, was the authoritative scientific outcome from Greenhouse '87, which led to the popular science content of the 1989 Lowe book. Looking back at the historical record, Bulkeley (2000, p. 37) and Henderson-Sellers and Blong (1989) have confirmed the seminal nature of this conference and its value to informing policy as well as the general public.

A year later, another CSIRO project was organised with the federal government's Commission for the Future (CFF). Greenhouse '88 has been characterised as "extraordinarily ambitious" (Lowe, 1989, p. 5) with conferences in all capital cities plus Cairns. Local meetings were held to establish planning committees for future action. The committees were composed of generally well-informed individuals committed to improving the level of community awareness. These were many of Henderson-Sellers'

interviewees for the high level of public knowledge analysis looked at earlier in this chapter.

US atmospheric scientist, Stephen Schneider, gave the keynote address at Greenhouse '88, saying scientific consensus and evidence were sufficient to take action (Lowe, 1989, p. 6). Other speakers included: Science Minister Barry Jones; then Victorian Minister for Education (and soon to become Premier) Joan Kirner; and Commission Chairman, broadcaster and writer Phillip Adams—and the documentary record shows many organisations, public and private, were also involved.

For much of the recent historical record on climate change communication, Schneider played a significant role, starting with his 1976 book *The Genesis Strategy* in which he famously predicted that in 2000 the effects of human activities will emerge from the background noise of natural variation (Schneider, 1976, p. 228), which proved to be close to the mark. However, during the 1990s he also was instrumental in diffusing the scientific language of the IPCC to emphasise the uncertainties. Journalist Geoff Strong, who covered climate change during these years, observed that raising the profile of uncertainties unwittingly played into the hands of denialists and naysayers during the 1990s (thesis interviews, G. Strong, April, 2007; S. Schneider, October, 2007) further discussed in chapter 9. [10]

Local discussions following Greenhouse '88 continued for two days and organisers counted 8,000 people involved, claiming it was the largest conference ever held to that time on an environmental issue. Graham Richardson was federal environment minister at the time, and he and local elected officials "jostled for places on the regional platforms" (Lowe, 1989, p. 6).[11] Lowe also notes:

> The mass media took up the question of possible climate change with great enthusiasm. *The Age* published a 4 page supplement in association with the

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[10] Stephen Schneider died in 2010.

[11] The role of Richardson is still debated, with many informants to this project guessing that his interest was purely political, counting "the numbers" of potential votes which, in itself, would stand as testimony to the strength of public awareness. Regardless of motive, his utterances in the media documentary record reveal a solid understanding of the magnitude of the risk. According to Ian Lowe, "Richo at first was just a pragmatic political fixer but when (Greens leader) Bob Brown took him to the Tasmanian forests, he became a convert" (I. Lowe, thesis interview, April, 2007).

> Commission. TV programs *Quantum* and *Beyond 2000* made special editions, a special Sunday Conference was devoted to the issue and it seemed to be on every radio station. Suddenly it seemed that everyone knew about climate change. Radio stations aimed at the youth market were particularly keen to take up the issue, reflecting their awareness of the great concern of young people about environmental issues (Lowe, 1989, p. 6).

In 1989, commitment to climate change action continued to build around World Environment Day in June (Lowe, 1989, p. 6). State governments released greenhouse response strategies focused on energy conservation and substitution for coal; local government looked at specific impacts, and schools and voluntary groups got informed and involved. The Commission for the Future released the *Personal Action Guide for the Earth* that also reinforces the early public understanding of the consequences of the greenhouse effect and the fact that the science in this regard has hardly changed in at least 20 years. The document states: "Scientists believe increasing levels of 'greenhouse gases' will cause temperatures to rise by 1.5–4.5°C over the next 40 years. Sea levels could rise by up to half a metre, threatening low-lying coastal areas with severe flooding," (Commonwealth, 1989, p. 5).

Australia's Early Emission Reduction Target

Fifteen months later (in October 1990) Australia set a so-called "interim planning (emission reduction) target" of stabilising greenhouse gas emission at 1988 levels by 2000, and reducing them by 20% from that level by 2005.

I have already mentioned the strategies that were current at the time: efficiency and fuel substitution measures. Public involvement efforts (i.e., communication) continued following the seminal greenhouse conferences and can be seen from a contemporary publication, undated but issued probably in 1991 by the federal environment department, called *Climate Change Program.* The series of fact sheets refers to the 1990 IPCC report, and the leading role of Australian scientists in producing that first international document and the emission reduction target. The publication's aim was to tell people how they might get involved to reduce emissions by, for instance, using an energy-efficient refrigerator, which "keeps the juice just as cold", as shown in figure 7, taken from the energy efficiency fact sheet. (The original text was "keeps the beer just

as cold" but this was deemed inappropriate for a family publication put out by the government).

Figure 7 Energy-efficient refrigerator

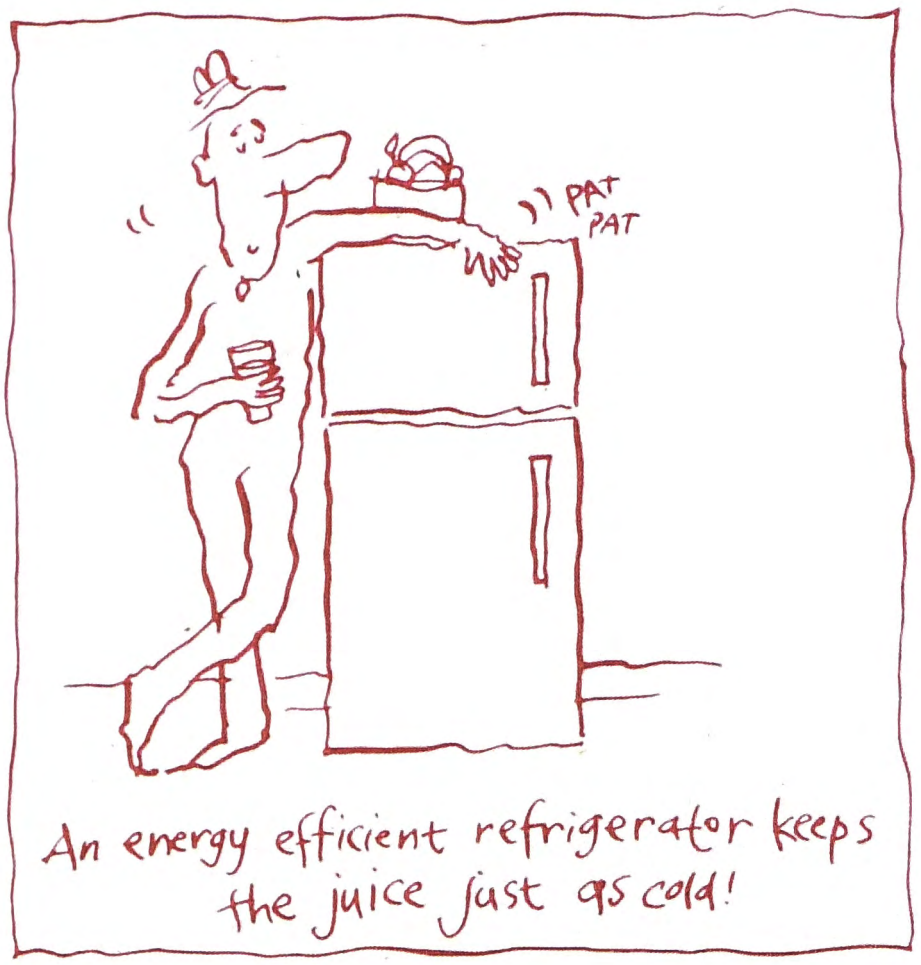

Figure 7. Illustration from "Climate Change Program", (Commonwealth, n.d.)

Energy efficiency was framed as a way to cut emissions significantly and as a win-win with cost savings. The above publication quotes a report that says efficiency measures and fuel substitution for heating, lighting, and transport (e.g., use of insulation, passive solar, fluorescent light bulbs and solar hot water, heat recycling, conversion to gas) could yield an 18.8% cut in carbon dioxide emissions over time, in line with the interim planning target of cutting at least 20%. At the same time, consumers and businesses could save millions in energy bills (Commonwealth, n.d.). As we shall see, this efficiency approach—called demand management—eventually fell to the growth and "more supply" lobby as state energy utilities were privatised and forced to compete on an open market.

At the time of the greenhouse conferences, Lowe records that the first rumblings of dissent regarding the science were audible in the background. He attributes the ability to attack the science on the "conundrum of 'proof' in climate systems". The feeling in the scientific community was that there was "broad agreement among atmospheric scientists that we are observing changes attributable to the greenhouse effect but dissent is still respectable," (Lowe, 1989, p. 11).

Scientists' Role as Public Communicators

The Greenhouse '87 and '88 events collaboration between the CSIRO and the federal government's Commission for the Future were arguably crucial to the early good public understanding. At the same time, CSIRO scientists had long been at the cutting edge of atmospheric research related to carbon dioxide levels and climate change. They also assumed a need to communicate this information. People like Graeme Pearman, Barrie Pittock, and Willem Bouma from the CSIRO Division of Atmospheric Research saw themselves from the start as public communicators as well as scientists (thesis interviews, June & Nov 2006, 2009). Pearman wrote, "Scientists accepted a responsibility to raise the awareness of climate change issues, and to promote the need for wider debate", (Pearman (Ed), 1988, p. vii).

Bouma described in some detail the communication role of the scientists at the Division, particularly the many opportunities to interact with politicians during the 1980s and into the 1990s (W. Bouma, thesis interview, June and November, 2006). He said that having an interested politician sitting on the Division's Advisory Committee, who was regularly briefed, was very helpful to the political understanding. Meanwhile the scientists, particularly Pearman, gave "stacks of briefings" to politicians during the study period, he said. That Pearman and other Australian scientists were on the IPCC review panels was another avenue for communication and influence. However by 1991, the fossil fuel industry and other opposition had rallied.

An early example comes from a scientific presentation at a Brisbane seminar organised by the Queensland government in 1989. Lowe reports that Griffith University scientist Roger Braddock presented a cautious paper reflecting great scientific uncertainty about the state of knowledge on interaction of atmosphere and oceans, that is, how, and how much, CO_2 from the atmosphere was being stored in the oceans.

> It was only too depressingly predictable that his paper would be misrepresented; the President of the Queensland Chamber of Mines wrote letters to politicians and various publications, claiming that Dr Braddock's cautious approach proved concern about climate change was unjustified hysteria from wild-eyed extremists (Lowe, 1989, p. 11).

It is notable that in December 1991 a prominent sceptic—Robert Balling, a climatologist from Arizona State University—was invited to the Australian National University where, it was reported, he called the IPCC report "scare mongering" and said there was no evidence of a hotter planet. The visit was sponsored by the Tasman Institute, a free-market think tank. Balling's visit was one of several by US sceptics, brought to Australia in the early 1990s by think tanks but also supported by the CSIRO and universities, in the name of free enquiry and debate (Commonwealth, 1992a, *Climate Change Newsletter*). Sceptic and atmospheric physicist Richard Lindzen, with some of the most relevant scientific credentials of the well-known critics, was invited to Australia by the CSIRO and addressed the Press Club in June 1992. He is quoted in an industry conference paper saying "most scientists in the field do not agree the case for action has been demonstrated" (Daley, 1992, p. 3).

Science Minister (1983–1990) Barry Jones recalls that before 1991 "I didn't have the Minister for Minerals and Energy shooting me down (and) at that time there weren't the hardball lobbyists" (B. Jones, thesis interview, November, 2006). However, he also points out that even during that early period the scientists with whom he spoke did not have a unified view on the human contribution to climate change, and that both the head of CSIRO Division of Atmospheric Research, Brian Tucker, and the head of the Bureau of Meteorology, John Zillman, while in the minority, were personally more sceptical and also influential because of their positions. Both these men, perhaps due to their disciplinary backgrounds, were critical of climate system modelling that could not be measured on-ground. See chapters 8 and 9 for further discussion on the values that scientists brought to the issue.

Still, while doing his job as then Chief of the Division of Atmospheric Research, Brian Tucker had edited a monograph on climate change science for the Australian Academy of Science as early as 1981. In June 1986 he would make a presentation on behalf of the Division to the Australian Environment Council (AEC) that helped galvanise the government into more research funding and also into communication activities, as recorded in a 1987 departmental minute to the Division (*Climate Change due to the Greenhouse Effect,* 1987).

According to Bob Chynoweth, the then federal parliamentary representative (MLA) on the Division Advisory Committee who reported back to Barry Jones during the mid-1980s, Tucker and his scientific colleagues also knew how to operate in the policy environment: "The real work was done by short-circuiting the bureaucracy and going straight to the Minister. That's how you got things done. Lobbyists go straight to the minister" (R. Chynoweth, thesis interview, November, 2006).

As one of Australia's lead scientists in the new field of climate change science, Graeme Pearman approached his role as a science communicator in much the same way. He appreciated early the integrated nature of sustainability science (going against tradition in an era when most scientists are reductionist) and communicated widely. He said his strength was to get to know and engage directly with politicians, bureaucrats, community groups like Rotary, and particularly the media, and that he saw this as a serious opportunity to benefit the taxpayer's investment in the research (G. Pearman, thesis interview, June, 2006).

His colleague at the Division of Atmospheric Research, Barrie Pittock, wrote numerous articles during the 1980s and 1990s for professional and lay publications focusing on the state of scientific knowledge and risk, and he tackled the still uncertain issue of regional and local impacts on Australia (B. Pittock, thesis interview, November, 2006). For example, the following summary comes from a paper in *Australian Forestry*, taken from a sample of articles, book chapters, and conference speeches from 1980 to the late 1990s (amongst dozens in Pittock's archives):

> The atmosphere beyond the year 2000 will be different from any experienced since before the last glaciation, more than 100,000 years ago. This will profoundly affect forestry locally and globally. Large percentage increases in carbon dioxide and other greenhouse gases will cause temperatures at a given location to be far higher than any in human history, and [*also cause]* large local changes in rainfall and humidity. These will greatly affect tree growth, species composition in natural forests, and fire frequencies (Pittock, 1987a, abstract).

A 1991 paper, co-authored by Pittock on climate change scenarios for Australia and New Zealand by 2010 and 2050, is notable also for the publisher—the journal *Climate Change*, which by then was in its 18th issue. In a 1987 presentation to a lay audience at

the Peace Research Centre, Pittock did not hedge his words: "The greenhouse effect throws into question the whole global trend towards increasing population, and industrialisation based on greater energy use" (Pittock, 1987). At the time, such plain speaking and policy comment was not unusual for scientists. Pittock's public interactions became more exceptional by the mid-1990s, as more scientists hedged their language or stopped public discussions altogether.

In the early study period, political leaders (e.g. Science Minister Barry Jones, Prime Minister Bob Hawke, Environment Minister Graham Richardson) publicly interacted with CSIRO scientists and their advisory board. In this way, MLA Bob Chynoweth personally briefed Bob Hawke, according to a Hawke speech to the Division on March 19, 1990 (Hawke, 1990).

Chynoweth supplied this thesis enquiry with a copy of an extraordinary speech he gave to Federal Parliament in October, 1987, in which he laid out in clear language some of the scientific scenarios of likely impacts of a warmer world, "a huge greenhouse" (Chynoweth, 1987). Direct human impacts included increased incidence of skin cancer and eye disease, and immune system depression and disease related to increased ultraviolet radiation. Collapse of ocean ecosystems came high on the list. "We must now accept the very chilling announcement that mankind is actually fouling its own nest. For the first time the life habits of one of earth's inhabitants is upsetting the very balance of all life on the planet". He reported to federal parliament more than 20 years ago the scientific prognoses of what would happen when temperatures climb 2–3°C. "Rainfall will increase by up to 50 percent in summer and there will be a decrease of 20 percent in winter", and there will be more cyclones, expected sea-level rises, and so forth (Chynoweth, 1987).

Nevertheless, Chynoweth said that despite the open exchange between scientists and politicians during this period, most of his colleagues did not speak of or voice concern about climate change. He said that many people just did not believe the sea level could rise. This can be seen as further evidence that leadership commitment to the issue made the difference in the policy arena. Then, as the 1990s progressed, green groups would gradually do more of the talking as the focus shifted to the political arena in the lead-up to the Kyoto Protocol negotiations, and political focus shifted squarely to economics. As discussed later, the shift from scientists to green groups was one element that

encouraged the political and media framing of less certainty and less mainstream interest.

Brian Tucker quit the CSIRO Division of Atmospheric Research (as outgoing chief in 1992) and thereafter felt freer to air his sceptical views, which he did with publications through the free-market Institute for Public Affairs (IPA) (B. Tucker, thesis interview, November 2006). There, he did not hold back on adding policy suggestions, criticising emission reduction targets, and other responses to lower risk. As he viewed it, these threatened to severely compromise the national economy. He suggested "planned adaptation" to any climate change would be the most sensible policy (Tucker, 1994, p. 1). His involvement with the IPA think tank, along with other sceptic scientists like geologist Bob Carter, added credibility to the IPA's subsequent attacks on atmospheric scientists and the credibility of modelling tools.

In regard to leadership, an important observation from the evidence gathered for the early study period is that climate change action was non-partisan during that time. Far from the political split on the subject that occurred from the Howard Liberal government on into the present, in the early period, at state and federal levels, the policies and leadership rhetoric of both major political parties were publicly committed to taking decisive action on climate change mitigation.

Thus in 1991, the then chairman of the Australian and New Zealand Environment and Conservation Council (ANZECC) was Bill Wood, a former Liberal MLA from the Australian Capital Territory. He wrote in a foreword to a report on the programs adopted by the states since 1988 to mitigate greenhouse gas emissions, that the Council had noted: "that the Intergovernmental Panel on Climate Change (IPCC) 'calculated with confidence' that emissions of carbon dioxide from human activities would have to be reduced by 60% to stabilise its concentration and that other gases would need to be reduced between 15% and 85%" (ANZECC, 1991, foreword p. i).

The summary of state responses that followed focused on the energy and transport sectors, and also on retaining native vegetation. New South Wales, for example, was looking at mandatory insulation of homes; government leadership on energy efficiency and investment in alternative technologies; and reviews leading to new restrictions on

clearing native vegetation—under then Liberal Premier Nick Greiner (*NSW in Climate Strategy*, 1989).

I consider it likely that the bipartisan consensus before 1991 would have been highly influential in allowing response measures and public understanding to proceed as far as they did. This is the baseline for contrasting the public debate and confusion regarding human agency in climate change led by Coalition politicians after 1995, and the ideological division that already was evident in the internal bureaucratic debate, under the Keating Labor government after 1991.

Stopping Emissions and Wishful Thinking

Reflecting the good public and political understanding of the late 1980s, CSIRO climate scientist Graeme Pearman noted: "In the late 1980s we still had a chance to stop emissions at 350 ppm" (G. Pearman, thesis interview, June, 2009). The figure of 350 ppm of CO_2 in the atmosphere had become a scientific benchmark for a concentration where negative impacts are still considered reversible over the course of a century.

Some twenty years later, in 2008-2010, influential government economic consultants and advisers (e.g., the Garnaut Climate Change Review, Emission Trading Scheme (ETS) modelling) assumed a course of "stopping" (combined) greenhouse gas emissions at 550 ppm in the next decades (Garnaut, 2010). The 550 ppm figure is more than double the pre-industrial level— with CO_2 emissions comparatively now at about 390 ppm. The policy timelines for emission reduction in the above reviews (30-40 years) exhibited a lack of appreciation of physical stocks and flows i.e., the long-term effect of accumulating gases. Instead there has been an apparent assumption that through some undescribed levers gas levels and related temperatures can be eventually adjusted as convenient to the needs of national economies (Glikson, 2008).[12] Such thinking is consistent with contemporary Australian government and business dedication to maintain and increase (with increasing population) status quo fossil fuel use and coal exports with no end in sight.

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[12] Early deep cuts in emissions are an advantage according to the physical reality explained in the 1995 IPCC science assessment and elsewhere. Any ability to stabilise greenhouse gas concentrations is governed more by the accumulated amount of emissions rather than by how those emissions change over time. Retaining status quo higher emissions (as Australia has done for the past 20 years and proposes to continue with) guarantees the need to offset by cutting more deeply in the future to have a hope of a stabilising even at a desired 450 ppm or 550 ppm (IPCC, 1995, p. 3).

It is notable that in 1989 it was already understood that a "business as usual" approach would set the atmosphere on track for 450–550 ppm of combined gases or CO_2-equivalent (CO_2 plus methane plus nitric oxides) within the 21 century—a level of greenhouse gases that atmospheric scientists then and since have said could well lead to dangerous climate tipping points where feedback loops including methane escaping the Arctic tundra cannot be stopped.[13]

In the 20–30 years following the early good public understanding documented in this chapter, most of the climate change discourse reported in the mass media became framed by those other than specialist climate scientists, with a preponderance of economists providing media commentary. Technology writer Ben Sandilands was one of many commentators in December 2008 who designated the federal Labor Government's emission reduction target of 5% of 2000 levels, based on the Garnaut review, as not reflecting the true risks. Sandilands blamed a popular discourse that is "scientifically illiterate" and a media "which is too lazy to inform itself about the realities" (Sandilands, 2008).

Restructure and Re-directed Research

The CSIRO is a government science organisation subject to restrictions by the "employer"—the politicians who fund and thereby direct the research agenda and the organisational structure. In Australia the majority of atmospheric research has been conducted by this semi-independent public entity in partnership with government departments—all subject to shifting rules about public communication.

A corporate restructure during the 1990s shifted the organisation away from public interest research to sponsored research, with far-reaching consequences—including the ability to communicate research outcomes, examined in chapter 9 where I look at the decline of public interest research and the evidence that some scientists were "muzzled"

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[13] Atmospheric scientists set 450 ppm of CO_2-e in the atmosphere as the outer limit where accumulated emissions lead to about 1°C warming—a scenario where change is still reversible. That means with appropriate emission reductions, the excess CO_2 in the atmosphere could be captured within a century (IPCC, 1995, pp. 6, 15–16; see also science discussion chapter 2 of this thesis).

from communicating on controversial topics such as climate change at the end of and following the study period.

As public interest research was sidelined, the later 1990s and early 2000s saw significant tension developing between the mining and the environmental branches within CSIRO (W. Bouma, thesis interview, November, 2006). The latter came to be seen as "too green", while the mining and exploration lobby steadily gained influence with federal politicians and "coal became king" in Australia (Pearse, 2009). The historical evidence suggests that, as the 1990s progressed, funding remained intact for basic research of climatic processes, but not so for response strategies to reduce energy demand or emissions. Research on energy-efficiency measures and technological solutions that competed with coal as a fuel was seldom funded, particularly after 1996 with the election of the Howard Government (Diesendorf, 2000; Hamilton, 2001). As importantly, the public awareness initiatives slowed and eventually stopped after 1992, during the main Keating and Howard government years.

SUMMARY ACCOUNT OF DISCOURSE LANGUAGE AND AVAILABLE KNOWLEDGE 1987–1991

The following summary account taken from a 1990 news feature (the full article is in Appendix 1), provides further detailed evidence for the public understanding/extent of knowledge of anthropogenic climate change by the early 1990s in Australia—the causes and likely consequences, and some paths to action. It also provides a clear example of the certain and non-debating communication style that framed the discussion about human agency and the central role of burning fossil fuels that emit carbon dioxide, this being the most common greenhouse gas under human control.[14] This is a typical example of the "givens" found in articles from this period.

The summary of known facts at the time was presented by *Sydney Morning Herald* reporter Paul Cleary (1990) with the headline "It's the end of the world as we know it". Inter alia, the article suggested that scientific analysis of causes and impacts, and

[14] Methane, a greenhouse gas considerably more potent than carbon dioxide, received relatively less attention during the study period. This may be because it is largely a problem stemming from the agricultural sector and livestock, and from waste/landfills—both considered less amenable to early efficient management than the transport and heating/cooling sectors.

analysis of conservation/renewable technology solutions, have withstood the test of time. However, this article also shows the beginning of the government and industry economic modelling on cost that came to dominate the discourse in later years, arguably inhibiting decisive action during the middle and late study period.

Cleary wrote (my comments in italics):

- Australia's economy is carbon intensive.

- Our output of greenhouse gases is rising at double the world average and our per capita emissions are among the highest.

- The Federal government (under Hawke) "has quite clearly embraced the concept of global warming and is keen to put in place a range of policies".

- The first IPCC report (1990) "provides virtually irrefutable evidence of global warming".

- The world was heading toward a climate convention (to become the Framework Convention on Climate Change, 1992) which, in turn, should lead to binding emission control protocols.

- [*It was thought at the time that*] there would be general agreement on cutting greenhouse gas emissions; the target was the Toronto goal of 20% below 1988 levels by 2005, which should be adopted by governments. The Toronto meeting of scientists and governments had agreed that significant global warming was a near certainty. [*Comment: Australia adopted the Toronto target as an interim planning target in October 1990 on the basis of "we will if others do"—in order to protect the economy.*]

- A carbon tax on wealthy nations was seriously being considered at the time.

- The 1988 Toronto conference coincided with a severe drought in North America and elsewhere, which ignited the media's attention.

- The government was being urged at the time to become a "fast follower" of technological opportunities for business development related to greenhouse mitigation.

- Substantial government "intervention" in the economy would be required. [*Comment: As we learn, this is ideologically unacceptable to market economists who ruled the federal industry and trade portfolios, and were able to hedge the language and goals of emission reduction to base it largely on voluntary efforts like the later Greenhouse Challenge program for industry. Communication should loom large with reliance on voluntary programs, but the available evidence shows no upsurge.*]

- Cleary accepted that "There is little doubt that the cost of achieving such a target, both in terms of resources and standard of living, will be huge". [*Examples given by Cleary show that Australian resource industries were starting to do their own figures; e.g., coal-miner CRA was warning that cutting emission by 20% would hike power charges by 40%; raise car prices 25% and petrol 120 %—much later shown to be serious overstatements or ambit figures—e.g., by the 2006 Stern Report and the 2007 IPCC report.*]

- Policy responses considered included "ironing out inefficiencies that had long been a way of life" such as:
  - state government subsidies for electric power generation that kept prices low
  - state electricity authorities should stop increasing capacity and focus on helping consumers conserve (demand management).

- Other detailed proposals worked out how much CO_2 could be saved if solar hot water were promoted to a reasonable level—8 megatonnes (MT) a year. There are similar figures for energy efficiency of appliances and refrigerators; switching to natural gas; retrofitting homes and calling for energy-efficient design of new homes as part of the building code; as well as developing energy audits—it was all there and could be achieved within 15 years (i.e., by 2005), saving about half of the 40 MT of CO_2 then emitted by households annually.

[*This article does not mention fuel efficiencies and the auto industry, but those were other areas discussed at the time where efficiencies could be made, and involved federal rather than state government regulations.*]

- Energy-intensive industries, such as aluminium, could make process adjustments to save on electricity and low-energy intensive industries could make savings by redesigning new buildings and retrofitting old ones e.g., estimates that aluminium could cut its emissions by one third (32 MT) annually by changing process from electrolysis to direct reduction.

- Cogeneration (electricity) with natural gas could cut emissions by 10% or 25 MT.

- Some cleaner coal burning options at the time, such as gasification, could achieve savings up to 25% or 50 MT.

- One easy, positive outcome would be the elimination of another greenhouse gas—chloroflurocarbon emissions (18% of the total)—by 1995, thanks to the global treaty to ban these gases to protect the shielding ozone layer.

Taken together, the options outlined by Cleary posed a challenge to the status quo, but not a "freeze in the dark" proposition. As government analyses commissioned at the time pointed out (e.g., Commonwealth, 1989a) there were plenty of dollar savings and job creation possibilities to make it a potential "win-win" scenario. In the event, almost none were put into effect.

Comparative Science Communication from the Government Sector

One publication, released at the end of the early study period in 1992, is a noteworthy example of science communication of a difficult subject. The National Greenhouse Advisory Committee, chaired by Henry Nix and whose main brief was to quietly fund research, was seconded by then federal Environment Minister Ros Kelly to explain climate change science to the general public. The resulting publication used plain

English as it transferred the messages from the 1990 IPCC report and put in context a few other things as well—an early attempt to set the record straight on sceptic debate and misunderstandings of the science.

For example, it tackled "red herrings" and charges of "science by consensus" at the IPCC. It pointed out that the IPCC process was not an exercise in reaching consensus but instead involved hundreds of scientists who peer reviewed the body of global scientific evidence available at the time. This review was then communicated to policy-makers at the national level. An example of a "red herring" was the sceptic's refrain that changes to the world's climate have occurred before and will again naturally—ignoring the unprecedented rate and rapidity of change caused by human activities. The publication noted: "Climate change induced by the enhanced greenhouse effect represents change to the planet's climate system at a greater rate than experienced for at least 10,000 years" (Commonwealth, 1992a, p. 41). (This comparison has since been amended to "at least 100,000 years" and more recently 400,000 years as the CO_2 level continues to rise).

This publication also presented the public with a graphic depiction of the temperature consequences of delay, calculated in the 1990 IPCC report, and explained thus:

> "If human-caused greenhouse gas emissions were reduced by 2% per year starting in 1990, then there would be 0.7°C less warming in 2100 than if we waited until the year 2010 to take the same action. In terms of sea-level rise the difference would be 15 cm" (Commonwealth, 1992a, p. 40).

CONCLUSIONS

A significant finding of this thesis research is the level of public knowledge and public understanding shown by the documentary evidence for the early study period i.e., 1987–1992. This evidence is found to be persuasive of a remarkably good state of early public knowledge regarding the risks and remedies attached to what was then called the "greenhouse effect". The greenhouse effect was presented in books, media reports, and government documents of the time as atmospheric pollution caused by human burning

of fossil fuels and release of other greenhouse gases. Interviews with persons involved with events in the early study period and later, support and elaborate on the documentary record, as proposed in the methodology.

Evidence from the early study period is examined in some detail in this chapter as a baseline for comparison with the discourse framing and communication of the following 1990s, where much of the public knowledge appears to have been deconstructed into uncertainty and denial. Review of successive IPCC reports for the study period shows the science findings barely changed between the first IPCC report in 1990 and the one in 2001, only growing more urgent with findings about possible rapidity of climate changes.

Reasons for Significant Early Public Knowledge

The review of the early study period finds that scientists, working with the media and with acceptance by bipartisan political leadership without contrary framing, played a large, direct role in the good public level of knowledge and acceptance of anthropogenic climate change phenomena, and the need to take action. Policy-makers took a global, ethical approach to Australia's response strategies during this period. Nationally and state-by-state, such strategies were developed, particularly in the energy arena.

An important finding that emerges in reviewing government documents and newspapers from the early study period is that scientific confidence and certainty were reflected in discourse language and the confidence of response activities—i.e., politicians, as well as the media and the public when it was polled, accepted the evidence at that time and wanted action. The evidence supports the hypothesis that the way scientists see themselves as communicators, and use language with lay audiences and politicians, is an important (and arguably under-appreciated) driver of the public and policy discourse, and this could be a fruitful area for further research.

The record indicates the important role of political and media leadership in the Australian democracy, showing that until 1992 the agenda set by these two institutions made climate change action a mainstream issue relevant to the wider electorate, not, as it later was framed, as a sectoral green issue. Researchers Henderson-Sellers & Blong (1989) concluded public awareness of anthropogenic climate change in Australia in the

late 1980s led the world. This thesis investigation concurs that public knowledge in Australia was significant. How it changed dramatically to a sceptical debate, under what influences, is investigated in the following chapters.

Table 2 Chronology: Some Major Climate Science/Policy Milestones.

1800–1910	Industrial revolution; at the beginning of this period, level of CO_2 [15] in the atmosphere is about 290 ppm according to the ice core record; technological advances include coal-fired energy with related emissions and means for expanding land clearing; sanitation and medical advances promote population growth.
1896	Swedish scientist Svante Arrhenius publishes first calculations speculating that human activity burning fossil fuels creates "extra" CO_2 that might make the earth's temperature rise significantly over time.
1939–1945	World War II; nations expand their mission to control and exploit world oil supplies begun in the 1920s, adding more emission sources. Following World War II and technological innovations, resource exploitation, forest clearing, and population expansion all explode.
1930s	Scientists suggest anthropogenic global warming is underway driven by more CO_2 and other greenhouse gases in atmosphere due to human activities. This was known then, and until 1990s, as "the greenhouse effect".
1950s	With computer technology, scientific advances allow modelling of the atmosphere, and understanding of climate feedback that accelerates warming or cooling trends, plus the realisation that oceans would not be absorbing all the CO_2 produced by humans.
1960	*Detection of annual rise of CO_2 in the atmosphere and measurement at 315 ppm.*
1967–1968	Calculation that doubling CO_2 will raise temperatures by several degrees; understanding that polar ice sheets could collapse and elevate sea levels.
1970	First World Environment Day signals strong upsurge of environmental interest and understanding. In the US the creation of the National Oceanic and Atmospheric Administration (NOAA) creates world's biggest funder of climate research. Scientists begin organising with risk messages about human impacts on climate.
1972	Further research of proxy records (ice cores mainly) confirm possibility of rapid climate change within a millennium (later brought down to decades).
1975	Discovery of damage to the ozone layer and the beginning of a 10-year battle for an international agreement to restrict human-induced causes is a precursor to global climate negotiations, with many of the same sceptics and societal challenges evident as would appear with the greenhouse effect. That ozone-depleting chemicals and ozone itself can contribute to the greenhouse effect is shown in the next year.
1970s	Better understanding gained of other possible influences on climate, including sunspot and orbital cycles.

[15] In this events table I use CO_2 (carbon dioxide) not CO_2-e (CO_2-equivalent, which includes other greenhouse gases), as the measure of greenhouse gas emissions.

1979	Second oil "energy crisis" sees upsurge in renewable energy technology, efficiency measures, smaller cars, calls to lower consumption—showing feasibility of these technologies and behavioural changes (this understanding and these technologies were still influential in the late 1980s, as documented in this thesis). First report on the greenhouse effect by US National Academy of Sciences says it is "highly credible" that doubling atmospheric CO_2 will raise average global temperatures by 1.5–4.5°C; World Climate Research Program launched. Election of Ronald Reagan as US President (and Margaret Thatcher as UK Prime Minister) starts two decades of backlash against environmental understandings and environmental activism. It has been noted that a related set of beliefs dominated Anglo/American countries—UK, US, Canada, Australia: neo-liberal market ideologies underpinned by beliefs in limitless resources and a self-adjusting natural world.
1980	The Australian Academy of Science organises a conference to review the thinking of leading scientists on the greenhouse effect. *Playboy* magazine covers the threats posed by the greenhouse effect, extensively quoting Australian scientists.
1981	Scientific prediction is made that greenhouse warming "signals" would emerge from background "climate noise" by 2000 and be measurable; 1981 declared "warmest year on record" at the time.
1985	Villach, Austria: United Nations Environment Programme/World Meteorological Organisation (UNEP/WMO) scientific conference yields major public pronouncement by scientists linking anthropogenic increases in greenhouse gases with global warming—showing consensus within climate science community and calling for international action to curb emissions; a 541-page report is produced in 1987. The conference statement acts as a catalyst for global action. It opens: "As a result of the increasing concentrations of greenhouse gases, it is now believed that in the first half of the next century a rise of global mean temperature could occur which is greater than any in man's history." Antarctic ice cores show that CO_2 and temperature went up and down together during the ice ages. Scientific calculation that disruption—with ice-melt fresh water—of the North Atlantic ocean circulation (the warming Gulf Stream) can bring sudden and dramatic climate change in the Northern Hemisphere (i.e., paradoxical cooling).
1986	CSIRO Division of Atmospheric Research briefs Australian federal and state Environment Ministers' Council (ANZECC) on the risks posed by the greenhouse effect.

	CSIRO, with support from Australian governments, initiates two conferences—Greenhouse '87 and Greenhouse '88—that are credited with spurring Australian public understanding of greenhouse to world-leading proportions.
1987	Montreal Protocol of the Vienna Convention succeeds in international agreement to curb ozone emissions and is cited as an example that international agreement on atmospheric pollution is possible. First CSIRO national conference on greenhouse/climate change in Australia.
1988	News coverage of greenhouse effect escalates; framed as risks in response to record heat and drought in the US and elsewhere. Testimony to US Congress by leading NASA atmospheric scientist James Hansen that he was 99% certain climate change had begun, based on the series of warm years in the 1980s. In Australia, media coverage also in response to second CSIRO and Commission for the Future conference and political/public discourse on the topic. Intergovernmental Panel on Climate Change (IPCC) established by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP) to advise national governments on best available scientific evidence on climate change, causes, consequences, and response strategies, based on peer-reviewed publications; to report to second world climate conference in 1990 (first IPCC report). Toronto "Conference on the changing atmosphere" attended by scientists, economists, and national leaders; call for action describes human activities as a vast, unplanned experiment upon the planet. *Level of CO_2 in the atmosphere reaches 350 ppm.*
1989	"Declaration of the Hague" by 24 nations including Australia recognises global significance of climate change and calls on all nations to participate in a Framework Convention in 1992. Hawke Labor federal government takes a leading role internationally on climate change. April: Federal government sets up a National Climate Change Program with a National Greenhouse Advisory Committee of scientific advisers and a Prime Ministerial Working Group to assess achievable targets, and set priority research areas and objectives. The Global Climate Coalition is founded by fossil fuel companies, and other corporations with economic interests in the status quo, to "fight back" against climate science and proposed action.

1990	First IPCC Assessment Report, made to second world climate conference in Geneva; Australian scientists play prominent roles on the panel of 170 scientists assessing the published science at this time, backed by 200 scientists conducting peer review of the draft report. First IPCC report notable for its direct and clear language of certainty and risk. Initiation of ecologically sustainable development (ESD) working groups under Hawke government. A unique attempt to develop sustainable policy in nine sectors of the economy in "accord" style roundtable discussions by main societal sectors including environmental and community groups, plus government and industry. Greenhouse/climate change tackled by an inter-sectoral group that made significant recommendations, later watered down by federal bureaucracy. Industry concerns about economic "cost" of climate change mitigation action enter public discourse; coal industry moves to forefront and "debate" is initiated. Federal and state energy portfolio ministers in the Australian Minerals and Energy Council release report, and initiate studies and action to lessen emissions from that sector; significant because it shows early understanding by this portfolio. October: Federal government releases "interim planning target" to stabilise CO_2 emissions at 1988 levels by 2000, and reduce them by 20% from there by 2005.
Late 1990 and 1991	Treasurer Paul Keating (to become Prime Minister in 1991) commissions both ESD greenhouse working group and Industry Commission to investigate cost and benefit of taking action; he receives widely divergent responses; Industry Commission "frame" focusing on economic cost becomes a pivotal turning point in the national discussion.
1991	Change of federal leadership in Australia, Keating replaces Hawke.
1990s overall	Characterised by increasing influence and then total dominance of neo-liberal/free-market economic policies, shunning regulation, and shifting from public to privatised energy infrastructure based on coal, gas and hydro-electricity. This period cements investments with 40+ year time span in conventional energy infrastructure and production (e.g., coal-fired electricity plants). Deregulation and competition in energy and other markets switches emphasis from lowering consumer and industrial demand to mitigate emissions, to an emphasis on profit via greater consumption and more supply.
1992	UN Conference on Environment and Development (Río Earth summit); Australia still argues for binding emission targets, rejected by the US under President George H. W. Bush. UN Framework Convention on Climate Change (FCCC) unveiled at Rio Summit; Australia is a signatory (ratified by federal parliament in December 1992), making it eighth of 192 parties that signed by 1994. The convention sets some goals like 2000 as

	the year for returning emissions to 1990 levels, and obligating signatories to adopt national policies to limit emissions.
	National Greenhouse Response Strategy (NGRS) established; reflecting influence of dominant market ideology, NGRS rejects regulation for greenhouse response strategies at federal and state levels. Focus turns to business concerns and priorities, and voluntary industry action, but there is now a reduced focus on alternative energy supply—efficiency measures and renewable technologies at the state level, and international participation at the Commonwealth level.
1994	Greenhouse 94 organised by CSIRO and New Zealand scientists, leading to 1996 book cited in sources (below); organised to review science in lead-up to first conference of the parties to the FCCC. Thereafter, Australian Academies of Science, Engineering and Social Science report jointly in 1995.
Mid-1990s	Scientists gain better understanding of possibilities and mechanisms of rapid climate change; international scientific reports and warnings of risk continue from, inter alia, UK Meteorological Office, the US National Aeronautic and Space Administration (NASA), US Academy of Sciences, NOAA, and other international institutions.
1995	Second IPCC assessment reports on science, impacts, and responses to anthropogenic climate change; confirm and continue the risk analysis set out in 1990 reports; however, language changes to a more cautious/academic modality.
	Australian National Greenhouse Response Strategy (NGRS) published but scarcely implemented.
	First conference of the parties to the FCCC, held in Berlin, Germany; leads to Berlin Mandate, which calls for agreement, by the end of 1997, on greenhouse gas emission reduction targets. The Kyoto Protocol of 1997 is to establish specifics of targets and methods for each country.
	A key frame shift is evident at Berlin; Australia changes its position in international negotiations from ethical-based to an economic-based position, arguing the "special needs" of its fossil fuel-specialised economy.
1996	Change of federal leadership in Australia to Coalition and John Howard.
	Second conference of the parties to the FCCC held in Geneva, Switzerland. Australia's policy frame continues to shift and Australia establishes itself as a "climate change laggard" (McDonald, 2005, p. 225). [16]

[16] "Immediately before the conference the government questioned the science of climate change and opposed the idea of the IPCC's new conclusions on climate change impacts providing the basis for negotiations … These would 'hurt Australia'" (McDonald, 2005, p. 225). Australia was joined by the OPEC states and the Russian Federation. US and Europe supported binding emission targets at the time, with the US under President Bill Clinton who was elected in 1993.

1996–2001	Transition to complete neo-liberal, economic rationalist dominance (hegemony) of public policies and discourses. International stance now about economic "national interest" and Australia's special case. Cuts or dismantling of research programs focused on energy efficiency, and renewable and alternative sources. Strong ties to neo-liberal think tanks. Attacks on, and marginalisation of, environmentalists. Reports that climate science communication is discouraged from government-funded institutions during this period and later.
1997	Australian Greenhouse Office established. National Greenhouse Advisory Panel (established under Hawke) of scientists, industry, unions, consumers, and government representatives effectively disbanded (not asked to meet after this year). National Greenhouse Response Strategy reviewed; outcome critiqued as weak and ineffective due to lack of leadership, inability to separate public interest from narrow commercial interests, and lack of informed public discourse. Australian media reports exhibit strong shift in emphasis from science story to political economic story in the lead-up to the Kyoto Protocol, and document considerable industry resistance to action. November: Kyoto Protocol to the FCCC agrees nations to reduce emissions by 2012; signed by 163 countries including Australia (which eventually declined to ratify until a change of government at the end of 2007).
1999	New National Greenhouse Strategy developed with emphasis on voluntary action.
2001	March: Newly inaugurated US President George W. Bush renounces Kyoto Protocol on national emission reduction targets, soon to be joined by Australia; a new stage of political scepticism and denial ramps up in both countries. IPCC Third Assessment report; echoes risks outlined in first two assessments in greater regional detail, using language of scientific probability and uncertainty. By December 2006 a report by the Australian Greenhouse Office regarding domestic emissions "predicted greenhouse emissions generated by rising demand for coal-fired electricity would increase by 62 per cent over the next four years, and by 127 per cent by 2020" (Beeby, 2006).
	By 2009, level of CO_2 in atmosphere has risen to 390 ppm. Combined with methane and nitrous oxides (CO_2-e) the level is 450 ppm.

Sources. Bouma, Pearman & Manning (1996); Diesendorf (2007); Flannery (2005); Hamilton (2001); IPCC (1990, 1995, 2001); Weart (2003); Australian Government documents; industry documents; media reports.

CHAPTER FIVE

POLICY FRAMEWORK AND POLITICAL CHANGE 1987–2001

"It wasn't raining when Noah built the ark, but at least he listened"
(Anonymous, cited by Moffat, 1992 in *Greenhouse effect, science and policy in the Northern Territory)*

INTRODUCTION

Having looked at the concept of framing and how the greenhouse effect was framed in the public discourse between 1987 and 1992, I now turn to the political context of climate change communication in the study period and discussion of the events chronology (Table 2). In this way I propose to start examining the dramatic changes in communication frames following the public understanding baseline outlined in the previous chapter, and to propose the hypothesis that these changes were driven by changing leadership and political/economic ideology rather than by the scientific findings, which remained relatively consistent throughout the study period.

The evidence for the consistency of scientific findings can be found in the IPCC reports (IPCC 1990, 1995, 2001) released during the study period, even while the language of certainty in these reports changed in significant ways that also affected communication. Bulkeley commented that after the proactive role of the scientists in raising the issue and urging a precautionary approach, by the early 1990s "the role ascribed to science was narrower, focusing on the need to reduce uncertainties in greenhouse science" (Bulkeley, 2000a, p. 38). The evidence discussed in the previous chapter supports the proposition that scientists played a leading role in the early significant public understanding. Evidence gathered for this chapter also shows diminution of the scientists' communication role while other sectors came to the fore and this is considered influential to the outcomes by the end of the decade.

The policy framework for this period has been documented extensively by Bulkeley (2000a), Diesendorf (2000), Hamilton (2001), Lowe (2007), Pearse (2005, 2007), and McDonald (2005). In particular, this project owes a debt to the in-depth chronology of Australian politics up to the Kyoto Protocol discussions of 1997, provided by Hamilton

in his 2001 book *Running from the Storm*, and to Pearse with his 2007 book *High and Dry* and his preceding PhD research.

The two "popular" books by academic authors draw a picture of official denial and inaction, building through the 1990s, in the face of consistent anthropogenic climate change science messages in IPCC reports. This changed discourse was facilitated by neo-liberal think tanks and noisy sceptics, and fuelled by a potent and high-level lobbying campaign of federal politicians by energy and extractive industries determined to retain and expand the existing energy supply and export sector. These researchers note the success of this endeavour was made easier by a revolving door of ideological policy-makers and economic advisers switching in and out of senior government and business group positions. They formed a like-minded elite network directing Australia's response to the science.

Unlike the well-documented policy events, a companion longitudinal study of climate change communication in Australia has not previously been undertaken. This thesis thereby aims to add a vital dimension to the 1990s political story. The integration of the policy and media story with communication frames in this chapter can be compared with the baseline of good public knowledge in the early study period.

BACKGROUND: THEORY AND POLICY

Bulkeley (2000a, 2001) has provided a theoretical framework and a contemporary record of the formation of Australian climate change policy, 1985–1995, drawing on analysis and interviews from the mid-1990s. She has drawn on testimony from participants in the events of that time—such as scientist and science communicator Ian Lowe, and former environmental organisation head and later senior federal bureaucrat Phillip Toyne, as well as energy analysts and economists George Wilkenfeld, Clive Hamilton, and Hugh Saddler at the Australia Institute during that period. Bulkeley draws the events of this period within a framework of "ecological modernisation", a term used by Hajer (1995) [17] and other social scientists (primarily European researchers) studying environmental politics and the discourses that ensue.

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[17] Bulkeley's analysis appears in Gillespie and Burns (2000, pp. 33–50). Dryzek and Schlosberg (1998) devoted a chapter with various authors discussing ecological modernisation, including a paper by then US vice-president Al Gore, whose "green capitalism" they say is entirely consistent with the concept. While Dryzek and Schlosberg say it is mainly a European idea, it is familiar in Australia, revolving around the

Ecological modernisation is the premise that existing political, economic, and social institutions can internalise care for the environment. In the climate change discourse this means there is no need to alter the underlying assumptions about a growth and development orientation for society, and an acceptance of the ensuing tensions between economic and environmental/ecological discourses. A prime example of this tension has been the acceptance that Australia can have a growing coal-based energy and export economy while simultaneously addressing related emissions linked to climate change.

In this way, Australia's greenhouse policy efforts during the study period basically stayed within the economic growth, "status quo", framework—notwithstanding early mitigation proposals like fuel substitution or renewable energy production. Throughout the study period, changing communication and official policies failed to meet stated environmental goals according to Bulkeley (2000a) who concludes:

> The [Australian] approach is in keeping with an ecological modernist policy discourse that favours the rationalisation of ecology through the existing institutions of modernity, rather than seeking to challenge industrial modernity as part of the ecological problem … it can be seen that the adoption of "rational ecological modernisation" by the business and government sectors through the principle of "no regrets" led to the scaling down of potential Greenhouse responses during this period (p. 49) [18]

GREENHOUSE POLICY: KEY ELEMENTS THAT CHANGED

Tracing the policy arc and the communication framing from the late 1980s, a picture emerges of how the focus on growth and resource extraction industries—long-standing drivers of Australian politics and the economy—co-opted the early good public understanding at the start of the study period.

That such a reversal is possible is also suggested by German research showing that social consensus and public understanding on a scientific issue, specifically climate

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concept that to visibly green corporations—and for business to be "clean and green"—is a "win-win", without changing basic products. "Greenwash" is the less flattering term for aspects of this practice.

[18] "No regrets" is jargon for the notion that response strategies will not disadvantage any sector of the existing economy or that they are responses that would have been taken anyway (by industry largely), even without the pressure of climate change mitigation and adaptation.

change, can change with the social or political context (Weingart, Engels and Pansegrau, 2000).

In this chapter I first look at the key drivers of policy, including mainstream focus and political leadership, how those shifted during the 1990s and then at the evidence showing framing shifts that occurred during the same period.

A Mainstream Issue 1980s–1991

As detailed in the previous chapter, Australia's scientific community, global weather events, and political leadership—all amplified by media—were the keys to awakening public and policy awareness in the late 1980s. Anthropogenic climate change, as then understood, was framed as a mainstream issue, not a sectoral "green" issue. The whole decade of the 1980s still reflected in policy many of the environmental understandings gained in the early 1970s, which saw the upsurge of the environmental movement as we know it. In popular publications the "greenhouse effect" was a widely discussed phenomenon (e.g. March 2, 1987, *Newsweek* cover story "Mother Nature's Revenge" 1987; Shears, February 1980, *Playboy*, "The Greenhouse Syndrome"). I summarise here, as context for later events, and further expand the evidence presented in chapter 4 that the greenhouse effect was communicated as a mainstream scientific and policy issue in the early study period.

Two scientific awareness-raising events—Greenhouse '87 and Greenhouse '88—became a cornerstone of the communication framework and informed policy. Internationally, 1988 was a big year for public awareness leading to policy, including US Congressional testimony by leading climate scientist James Hansen, of the National Aeronautics and Space Administration (NASA). Hansen testified that he was 99% certain that the 1980's warmer weather (along with a headline-grabbing drought) was a sign global warming had started. This was said to have galvanised the legislators at the time into considering rapid action (White, 1990). Australian reporters accepted the message of mainstream risk to societies. In June 1988, a *Sydney Morning Herald (*SMH*)* report by Paul Sheehan from Washington D.C. states:

> Scientists have warned about the "greenhouse effect" for years. Now it is no longer a scientific nightmare; it has arrived.

> The "greenhouse effect" is the term given to describe the gradual heating of the Earth's atmosphere caused by the increasing production of fossil fuels and pollutants.
>
> The atmosphere now has 25 per cent more carbon dioxide than it did before the Industrial Revolution. The more CO_2 in the atmosphere the greater the heating. Bill Genaro, a scientist at the (US) National Weather Centre, said: "The four warmest years of this century have all been in this decade. And 1988 may become the warmest year recorded in history. There is only a one in 100 chance that this sequence could be a statistical fluke (Sheehan, 1988, p. 1)

The 1988 Toronto Conference on *The Changing Atmosphere*, which was hosted by the Canadian government and, by invitation, attended by some 300 scientists, politicians, and economists from 48 countries, coincided with severe drought and high temperatures in North America. The conference, and its dramatic final statement of urgency and call for emission reduction targets, was widely reported in the media (Benesh, 1988)[19] and helped focus world policy attention, with an action model that seemed to have worked to curb ozone pollution—set targets internationally and let governments work out the policies to meet them (Weart, 2004). The conference's experts proposed reduction of CO_2 emissions to 1988 levels by 2000 and a further 20% by 2005.

This "Toronto target" was adopted by Australia among other countries as an interim policy goal in October, 1990. Toronto paved the way to the more formal IPCC structure, also established in 1988. The conference statement made it clear that climate change would affect everyone. It called greenhouse gas atmospheric pollution an "uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to nuclear war". World governments were urged to swiftly develop emission reduction targets (Changing Atmosphere, 1988).

Hundreds of scientists and some national representatives on the newly formed Intergovernmental Panel on Climate Change (IPCC) were asked to review the global

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[19] Benesh wrote in *The Sydney Morning Herald*, July 2, 1988 that the international call to action was attempting "to reverse the trend towards a hotter, drier, carcinogenic world before the pace of environmental deterioration accelerated beyond man's ability to stop it". This is one of many articles from the period that accepted the scientific risk assessment as fact and this was before the first IPCC report.

research on causes, impacts, and potential responses (three working groups) and report to the second world climate conference in 1990 in Geneva and every five years thereafter. Science reporter Fred Pearce wrote that, ironically, the IPCC concept was promoted during the US Reagan administration as an effort to contain or dilute noisy government scientists talking about these climatic changes as they did at the seminal 1985 Villach conference.

> The purpose of the IPCC was to put scientists back in the cages they had briefly escaped from at Villach, and to this day the IPCC's members are government nominees. But it was too late. The story of global warming—and what scientists really felt about it—was out (Pearce, 2005, p. 53).

The Villach Statement of 1985 clearly shows the early high level of scientific understanding of risk and urgency felt by scientists shown in Appendix 1(Bolin et al., 1986).

The year 1990 became pivotal in environmental politics in Australia with federal Labor looking forward to an election supported by environmental votes, the first IPCC report on climate change released, and interim planning targets for emission controls of CO_2 unveiled, aimed at an emission reduction to 1988 levels—based on the global Toronto target of 1988.[20]

The recognition that greenhouse/climate change science required a policy response coincided also with the Hawke federal Labor government's sponsorship of the "roundtable" Ecologically Sustainable Development (ESD) process in 1990. This unusual effort in democratic policy formation included environmentalists at the table with business, government, and labour to determine more sustainable economic strategies and include environmental costs in the analysis. An intersectoral taskforce was asked to investigate the curbing of greenhouse gas emissions from the energy sector.

Overall, there is good evidence that there was a window of time—following the Franklin Dam fight in 1983 and peaking in 1990–1991—during which environmental

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[20] No interviewee for this thesis seemed to remember the early emission reduction targets, which emphasised the need to rely on the documentary record rather than on memory.

issues were brought into the policy mainstream: an attempt to close the national argument between economic and environmental priorities. Former Science Minister Barry Jones (1992) said in a 1992 World Meteorological Day address:

> Green issues were extremely important in the 1980s and contributed to the Hawke government's electoral success in 1983, 1987, and 1990
> … [but]
> In 1991 with economic recession, the political priorities seemed to change. Jobs, jobs, jobs, became the priority and in some quarters there was a cynical reaction suggesting that environmental issues were luxuries which characterised affluent times … This is a criminally short-sighted view (p. 4).

Leadership

As in Australia, international leadership was evident in the late 1980s, at least at the rhetorical level. Robert M. White, then President of the US National Academy of Engineering, wrote in an extensive report on the scientific–political interface of climate change understanding in 1990 (with acceptance of human agency) that governments were rushing to outdo each other on advocating action to stabilise the global climate: "Soviet President Michael Gorbachev, President George (H. W.) Bush, Prime Minister Margaret Thatcher and French President Francois Mitterrand, share similar views on the climate-warming issue" (White, 1990, p. 18).

In fact, reportedly briefed by senior scientists and advisers, British PM Margaret Thatcher (1989)[21] made an extraordinary speech to the United Nations in November 1989, which is worth quoting at some length because it is solid evidence of the early knowledge available to policy-makers, which would not be considered outdated 20 or 25 years later. Addressing both secular and religious audiences she said:

> What we are now doing to the world, by degrading the land surfaces, by polluting the waters and by adding greenhouse gases to the air at an

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[21] Flannery (2005, p. 246) says it was James Lovelock as an independent scholar scientist (therefore not tainted as a "government scientist" in free-market eyes) who convinced Margaret Thatcher to take climate change seriously. Others have credited (Sir) John Houghton, lead author of the first three IPCC scientific assessments and a leading UK atmospheric scientist, then Director General of the UK Meteorological Office.

unprecedented rate—all this is new in the experience of the earth. It is mankind and his activities that are changing the environment of our planet in damaging and dangerous ways.

The result is that change in future is likely to be more fundamental and more widespread than anything we have known hitherto. Change to the sea around us, change to the atmosphere above, leading in turn to change in the world's climate, which could alter the way we live in the most fundamental way of all. That prospect is a new factor in human affairs. It is comparable in its implications to the discovery of how to split the atom. Indeed, its results could be even more far-reaching.

The evidence is there. The damage is being done. What do we, the international community, do about it? ... The environmental challenge that confronts the whole world demands an equivalent response from the whole world. Every country will be affected and no one can opt out. Those countries who are industrialised must contribute more to help those who are not.

Reason is humanity's special gift. It allows us to understand the structure of the nucleus. It enables us to explore the heavens. It helps us to conquer disease. Now we must use our reason to find a way in which we can live with nature, and not dominate nature. We need our reason to teach us today that we are not—that we must not try to be—the lords of all we survey.

> We are not the lords, we are the Lord's creatures, the trustees of this planet, charged today with preserving life itself—preserving life with all its mystery and all its wonder.

In the US, options for changing the energy delivery system were considered at this early date and were much the same options as available in Australia—conversion to gas, efficiency measures, renewable energy, and nuclear energy. As would happen in Australia in the following decade, the political response by the George H. W. Bush administration to reviewing the energy system was marked by an ideological commitment to free market forces and a distaste for regulation, carbon taxes, or any

change to the status quo seen to penalise industries, cost jobs, or change consumer choices (*Backgrounder on US energy production*, 1991).

Evidence for Early Leadership in the Public Discourse

It is clear from the thesis interviews that there is much uncertainty 25 years later on whether the Hawke federal Labor government was genuine in its concerns about environmental issues, including the greenhouse effect, or merely catering to an electorate with significant numbers of green voters flexing political muscle. Whether this matters, or is actually a chicken-and-egg debate, the public stance of the Prime Minister and key government ministers underscores the role of leadership in climate change public knowledge. Thus one senior political journalist wrote in the SMH in September 1988 about the federal scene:

> The greatest problem facing Australia today is not its external debt. It is clearly and undoubtedly the environmental threat posed by the Greenhouse Effect. This is not the view of some loony fringe greenie or Australian Democrat; it is the view of Senator Graham Richardson, Labor's right-wing hard man and colleague of the Treasurer, Paul Keating. (Seccombe, 1988, p. 17)

Seccombe wrote that Richardson (then Environment Minister) understood that the big picture is not just the immediate economy as his colleague and soon to be Prime Minister, Keating, believed. The big picture might demand considerable change and upheaval in the Australian status quo. He wrote that amongst the steady stream of information crossing the Environment Minister's desk was the cost of environmental damage including ozone and greenhouse-induced climate change—an annual estimate at that time of $5 billion for the US alone.

Nevertheless, this journalist's opinion in 1988 was that the Hawke Ministry as a whole did not comprehend the magnitude of the problem and was not seriously looking for answers—an assessment that has been seconded by John Kerin and Barry Jones who were in the Ministry at the time (J. Kerin, thesis interview, January, 2008; B. Jones, thesis interview, November, 2006). The general lack of understanding in ministerial ranks was also mentioned by MLA Bob Chynoweth who was on the CSIRO advisory board at Atmospheric Research (thesis interview, November, 2006).

Similar views on the importance of leadership were expressed by John Kerin who was Minister for Primary Industries and Energy under Hawke in the mid-1980s to 1991, and Minister for Trade and Overseas Development under Keating between 1991 and 1993. He co-signed with Environment Minister Ros Kelly the media release that heralded Australia's emission reduction planning targets in October 1990 (Commonwealth, 1990). In response to a question about early leadership on the issue of climate change, Kerin recalled: "I grew to have enormous respect for Hawke and felt his awareness of environmental matters was real and deep." In Kerin's view, the next Prime Minister Paul Keating relied more heavily than Hawke on the advice of economic rationalist economists at Treasury. Surveying the ministry as a whole Kerin says, "I didn't think we understood at all the implications of climate change." (J. Kerin, thesis interview, January 2008, complete interview in Appendix 2).

The highpoint of early action and strong leadership began in July 1989 when Prime Minister Bob Hawke issued his call to action on climate change in the environmental statement *Our Country, Our Future* (dubbed "the world's greatest environment statement" by the media). The first IPCC report in 1990 was released and subsequently quoted without debate in government documents (shown in chapter 4) as Australian governments were working towards a national greenhouse strategy (ANZECC, 1990). The planning target for emission reduction was signed and detailed action plans to lower carbon emissions from energy production, through efficiencies or alternative energy, were being developed in all states and territories at this time (ANZECC, 1991).

Led by the Prime Minister's office, the Australian Government set up the National Greenhouse Advisory Council in April 1989 as part of the National Climate Change Program. The Council was chaired by climate modeller and biologist Henry Nix from The Australian National University and was comprised mainly of researchers whose mandate was to fund further scientific enquiry (H. Nix, thesis interview, November, 2006).[22] A Prime Ministerial working group (part of the ESD process)—comprising government, community, environmental, union, and business representatives—was also established at this time. Its job was to assess achievable domestic emission reduction targets. Various intra- and inter-governmental discussions with the states ensued about

[22] Nix did not recall a discussion of the Toronto targets. Many other contemporary players interviewed did not recall Australia's first emission reduction targets.

the problem and strategies to combat looming climate change. For example, the Australian and New Zealand Environment and Conservation Council (ANZECC) produced various documents reviewed by this thesis project as evidence.

Who Was Advising the Leaders?

Despite setting up such formal structures, the practice by senior politicians of relying on minders, advisers, and old friends rather than on special groups or departmental advice was well advanced by the late 1980s according to the observations of Nix (thesis interview, November, 2006). Much of the advice may have been on how to stay in office through the next election cycle, but the question of "who" is within the advising network became an important factor and one often unseen to outsiders. In Hawke's case, the advice of the Chief Scientist at the time—Ralph Slatyer, an old acquaintance of the PM—was influential, and Slatyer reportedly took a keen interest in climate change, according to Nix. The previously mentioned scientist influence on British PM Margaret Thatcher appears a similar case. In Australia's case, the strong advice to act on certain environmental issues offered by a highly influential political operative such as Senator Graham Richardson acting as Environment Minister, was also clearly significant.

Another example, leading to quite a different outcome, was recounted by Hamilton regarding the lead-up to the Kyoto Protocol gathering in 1997. One of the most influential voices on climate change policy in the federal government of John Howard was a man described as Howard's "former flatmate" (Hamilton, 2001). Warwick Parer, then Minister for Resources and Energy, was a long-time veteran of the coal industry who was an open greenhouse sceptic and a tireless booster of coal as the cornerstone of Australia's prosperity. He was also alleged to be the Minister responsible for abolishing the federal government's alternative energy research corporation in 1998. A year later he resigned from Parliament, charged with conflict of interest due to his coal holdings (Hamilton, 2001).[23]

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[23] Hamilton, who was a contemporary observer of much of the climate policy events 1990s–2000s, also contends that often trade bureaucrats, who would craft negotiation documents and strategies, were unseen "true believers" in a trade and market ideology that first wrecked the Ecologically Sustainable Development (ESD) process and later brought a "virulently anti-European" perspective to climate policy. They saw Australia as resource "quarry" indistinguishable from the national interest (Hamilton, 2007).

The Start of Hedging

The October 1990 national interim emission reduction target aimed to stabilisé greenhouse gas emissions at 1988 levels by 2000. However, an oft-quoted caveat was introduced at the same time. It stipulated that there should be no adverse effects on the Australian economy—upon trade competitiveness in particular—in the absence of similar actions by other countries. Policy researchers, including Hamilton and Pearse, point to this caveat as an indication that—even at this early date—industry lobbyists, free market economists, and trade bureaucrats were winning with an argument that the fossil fuel economy must stay as it is (being Australia's "natural advantage") and that Australia should take no action until other countries did. These policy researchers point to the caveat as the start to back-pedalling in commitment to action. This slowing in commitment would gather strength during the 1990s to become a full retreat, accompanied by often-manufactured confusion and scepticism that marked the later 1990s.

The newspaper record also sheds interesting light on the early and conflicting understanding, within the Hawke Ministry, of Australia's reliance on coal exports and domestic fossil-fuel intensive energy generation, noting all the themes that came to dominate Australia's position in the 1990s. A report by *The Australian Financial Review* (Fin Review) writer Michael Stutchbury (1990, full text Appendix 1) provides compelling historical evidence of the early understanding, but also of the economic straightjacket Australia had fashioned for itself. The latter would underlie the policies of the 1990s and the reframe of communication that they called forth.

Ignorance, ideological beliefs, and scepticism in government ranks—which would affect policy and communication—strengthened during the following Keating and Howard governments without the strong leadership on the environmental front exhibited by Hawke and Richardson, with communication framing consequences. The leadership shifts interacted with the bureaucracy, where a sense of urgency was not evident from the federal Department of Primary Industries and Energy as early as 1991. The department was tasked with rapidly implementing modifications to national energy consumption and production as a response to the 1990 national emission reduction targets. The Commonwealth directs policy on vehicle fuel efficiency standards, appliance labelling, and also leads by example. It also assists state and territory energy

supply and demand, and can encourage energy efficiency—including setting up major communication campaigns.

A critical 1992–1993 report by the Australian National Audit Office (ANAO) into the Department's response again confirms the early understanding that contemporary greenhouse gas emissions are largely due to human burning of fossil fuels (and in Australia's case, very inefficient use, a recurring theme in the documentary evidence[24]). It also spells out the federal government's intentions in 1990 to take rapid response action, particularly to champion efficiencies (ANAO, 1993). About the department's response and understanding of its urgent brief, this report states that most of the federal government's response agenda to the 1990 emission reduction target remained in limbo:

> The Department did not fully respond in the manner expected … Right up to the announcement in October 1990 it had not fully anticipated the greater priority to be given to the subject … Staff meant to be available for putting the programs into place were heavily engaged on other tasks such as coal research grants, policy development and advising … this was the case right until the time of our audit, more than two years after the announcement (ANAO, 1993, p. xi).

Kerin, who relinquished the portfolio early in 1991, recalls saying to the junior Minister for Resources:

> There have got to be hundreds of ways of attacking this issue so, for God's sake, do something about local government and design and buildings and power saving … But I don't think he got anywhere because a lot of this area was in state hands and you know how hard it is to get this Federation to work. (J. Kerin thesis interview, January, 2008)

An article from that time in the SMH noted that the Department of Primary Industries and Energy advised Hawke that it would take 30–40 years to make industry more efficient, as old plant had to be replaced. The following excerpt explains the emerging

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[24] "Australia has a poor record of energy saving. Market research and technical studies indicate there is a significant untapped potential to save money and resources and stem carbon dioxide emissions. We are amongst the world's largest greenhouse gas emitters on a per capital basis. Our cars are amongst the world's most inefficient in terms of fuel consumption" (ANAO, 1993, p. xi). The audit report also says Australia lags behind other countries in industrial plant efficiency, in building construction and in public awareness of the need to save on energy.

paradigm, which would rule for the next 20 years, that no mandatory changes would be required of large industrial firms, or pollution costs be imposed.

> Almost a third of our CO_2 emissions come from just 60 large firms—capital-intensive, using equipment with a long economic life, and export-oriented. The costs of re-equipping would hinder export competitiveness. The alternative of exempting those industries would leave a disproportionate share of the reductions to fall on other sectors. (Seccombe, 1990a, p.15).

Seccombe also wrote in 1990:

> The Federal Treasury is determined to block moves by the Government to make industry cut down on greenhouse effect gases.
>
> On Monday, when Cabinet meets to consider targets for the reduction of greenhouse gases, the Treasury is set to attempt to delay the matter for up to a year by demanding a new inquiry into the problem (Seccombe, 1990, p1).

The signs of procrastination in the federal bureaucracy and policy arena notwithstanding, in the public discourse at least, strong intentions to respond were recorded until well into 1992, culminating with Australia's participation at the Rio Earth Summit and the simultaneous establishment of the UN Framework Convention on Climate Change. The Australian delegation, also including Trade Minister Kerin, was headed by then Environment Minister Ros Kelly who was already fighting the bureaucratic battles at home.

Meanwhile states and territories had developed action plans, which are part of the documentary record as outlined in a 1991 document by the Australian and New Zealand Environment and Conservation Council (ANZECC) (see Appendix 1 for an excerpt from this document). For example, in 1990 the ACT government released a document *Developing an ACT Strategy to Respond to the Greenhouse Effect*. The Northern Territory had a plan, and every state was working on one. The goal was to collectively achieve a 20% reduction in greenhouse gas emissions in accordance with the interim emission reduction target. Energy and transport sectors were identified as major sources of greenhouse gases, amenable to measurement and reform. The answer was regulation and incentives for efficient energy use in the residential, commercial, and industrial

sectors, as well as boosting areas like public transport. States promised to gear up for renewable energy programs. Victoria and Western Australia instituted "major" "demand management" programs to lower energy consumption (ANZECC, 1991).

In the event, most of these programs were destined to die on the altar of deregulation, competition policy, and free-market ideology (further discussed in the next chapter) in favour of purely "supply" options in succeeding years. A major communication shift that ensued was the reframe from risk management to cost management.

FRAMING SHIFT AFTER 1992

Reframing Emission Reduction

> *"The late 1980s science information didn't 'dissipate'—it was blasted away."*
> Engineer and communication consultant Deni Greene, thesis interview, August, 2006.

Energy analyst Deni Greene (whose archive of historical government and media documents provided a rare collection of documentary sources) was commissioned to prepare a number of analyses for the Hawke and then Keating government's Department of Environment and the ESD working groups. The brief was to identify opportunities to curb energy demand, quantify related savings, and explore job-creating new industries for energy production (Greene, 1990, 1990a). Her reports offered evidence that energy efficiency and conservation alone could meet Australia's interim emission reduction target and that it was a "win-win" option of saving money *and* the environment. Some observers at the time suspected or believed that the resource and energy industry associations complained about this publication to their contacts in government (A. Pears, thesis interview, November, 2006). In any event, the department subsequently drew back on commissioning her work (D. Greene, thesis interview, February, 2007).

This episode from 1990 may be early evidence of what Bulkeley (2000a) has observed: that the late 1980s' prominence of scientific communication and the mainstreaming of environmental messages and concerns may have been unconventional, and that a "more traditional policy discourse" returned fairly quickly. This included a reframing towards

the familiar environment *versus* the economy discourse as long manifested with the native forest dispute. The discovery that prevention of greenhouse gas pollution might incur costs was then used strategically to manipulate the public into uncertainty about the science, according to academic and energy efficiency specialist Alan Pears who was advising the Victorian government at the time (A. Pears, thesis interview, November, 2006).

A closer look at why this happened shows that by 1992 there was a strong awakening among the network of industries led by coal and aluminium that stood to lose from change in the energy sectors. Backed by free market economists, they were seeing the implications for their "business as usual" operations and a "fightback" began in Australia to counter the scientific risk assessments with effective political lobbying (Pearse, 2005).[25] Through industry documents and political allies, the public discourse started to be reframed to focus on costs and jobs, and also free market and "choice" ideology. The evidence indicates this counter argument started in response to the Australian interim emission reduction target and the recommendations for global action of the UN Framework Convention on Climate Change, 1992.

A representative sample comes from public relations firm CRA on two occasions. A 1989 CRA report on Australia's proposal to lower emissions by 20% from 1988 levels established some now familiar themes: it was alleged there would be little global effect and it would damage Australia's economy; holding down demand (through efficiency measures) would be costly and lead to unwelcome lifestyle changes; and battling climate change is just fear of change; also warming trends may benefit some agriculture (Dixon & McLennan, 1989).

A CRA report in the *Mining Review*, April, 1992, warned of severe economic consequences if Australia actually implements the UN Framework Convention on Climate Change commitments to lower emissions. The article rests on the "us" and "them" scenario. A theme that would become familiar was anti-United Nations and anti-European rhetoric decrying foreign forces trying to tell Australia what do, and damaging Australia's "national interest" as the UN and Europe were seen as the main drivers for binding emission targets. It is also an early example of the soon-to-become

[25] Pearse explored the industry lobbies and their effects on policy in a 2005 ANU PhD thesis that became the subject of a Four Corners Report *The Greenhouse Mafia* and a popular book on the same subject in 2007.

commonplace strategy of quoting Australian Bureau of Agricultural and Resource Economics (ABARE) statistics that were then amplified by the media and seldom questioned. Thus in this article, ABARE is quoted as putting a likely carbon tax at $160–200 per tonne, which would damage export industries and occasion massive job losses (Carruthers, 1992). (In 2011, discussion about carbon costing in Australia was canvassing between $10— $30 per tonne.) ABARE's Director Brian Fisher emerged during the 1990s as a reliable sceptic voice in regard to economics and the cost of response activities.

The CRA 1992 public relations report exemplifies many of the framing themes that came to dominate the decade. In addition to the above themes, the following also are mentioned:

- scepticism—it is not humans' fault
- loaded images—"who is behind the greenhouse panic?"
- market ideology—those who would push the greenhouse science do not believe as do "the rest of us that everyone should have options and be able to make choices"
- "us and them"—much of the 20th century has been a struggle over two fundamental positions: freedom and choice on one side, Marxism, fascism, and religious fundamentalism on the other side—"such people have now discovered environmentalism"
- suspicion of scientists' motives—they are just after grant funding
- contention that the media is being manipulated by "the totalitarians and less-than-scrupulous scientists"
- belief that acting to conserve biodiversity is against development interests
- argument that acting on climate change would have little global effect, but large costs, for Australia.

The communication shift from risk management to cost and uncertainty was also spurred by the economic downturn that came to a head in 1990–1991. The Australian Government's response, by then under Prime Minister Paul Keating, is described in an October 1991 business report in the SMH. Noting the Australian penchant for delay via reports and commissions, journalist Paul Cleary wrote that the most recent attempt to delay serious action was by referral of the problem to the Industry Commission. "The former Treasurer, Paul Keating ... was one of the prime movers in deferring a final

decision on the now-famous Toronto target, a 20 percent cut in emissions from 1988 levels" (Cleary, 1991). [26]

However, Cleary was impressed that the Industry Commission had developed something called the World Economic Degradation General Equilibrium (WEDGE) model specifically to crunch the costs of responding to climate change with 270,698 variables and 245,831 equations (Cleary, 1991)—an interesting example of how economic number crunching can be accepted uncritically in media analysis.

Energy analyst Deni Greene perceived Australian industry as a cohesive voice[27] fighting the science and potential response messages by the early 1990s. Like other contemporary observers, she also perceived the leadership of Paul Keating as weak or disinterested as far as energy policy and climate change were concerned. Like most interviewees who have informed this thesis, she saw him as focused on economic matters, starting with response to the 1991 recession, and also with economic rationalist reforms (D. Greene, thesis interview, August, 2006).

Keating himself has told other interviewers that he has acted as a defender of the natural environment and threatened ecosystems and landscapes in Australia, some of which indeed received federal protection during his tenure as Treasurer and then Prime Minister (*Labor in Power*, 2010 edition of a 1993 documentary).

Key Elements of the 1990s Discourse

Mercer (1991) and Pearse (2005) remind us that the long-running native forest dispute—involving industry and both major political parties, versus some members of the public—forged a blanket enmity on the part of rural and extractive industries (and the politicians who represented them) towards environmentalists and environmental groups. These were seen as extremists who were against the necessary "balance"

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[26] A year earlier, Cleary (1990) produced a lengthy feature in *The Sydney Morning Herald* that is notable for its contemporary summary of science, politics, and response on climate change. Excerpts from that article are at the end of chapter 4 and the full article is in Appendix 1.

[27] Greene said a lot of companies could have benefited economically from efficiency measures but did not speak out. She concluded that there was a business "kinship" response, and also thought they bought the "cost" argument. Industries that stood to lose from climate change, like tourism and insurance, were equally silent or acquiescent to the resource sector (Pearse, 2007).

between the economy and the environment. They were therefore cast as special interests that did not have "jobs" and the "national interest" at heart.

As the 1990s proceeded and industry groups came together to combat climate change action (as cited earlier in this chapter) and also documented by political analysts (Pearse, 2005, 2007), this framing of environmental concerns versus jobs and the national interest was amplified in media reports. The changed framing became more embedded in the public discourse once politicians and the media decided the climate change story was primarily political, and as green non-governmental organisations (NGOs) rather than scientists were interviewed or quoted. This change in emphasis to adversarial politics by the mid-1990s is indicated in the media surveys conducted for this thesis, and is particularly evident in the business media represented by the Fin Review.

The newspaper sample analysis conducted on the Fin Review 1995–1996 (30 articles) showed the reporting had shifted mostly away from a focus on the science and policy response story in an industry context (as seen in chapter 4), to an economic and political framework focused on the needs of industry. One of many articles from the mid to later 1990s reflects the general tone: "Australia's push for international greenhouse policy to focus on economic issues, rather than narrow technological or environmental targets, is likely to receive a warm hearing at a major conference on climate change in Geneva" (Callick, 1996a).

Journalist Michael Stutchbury continued to dissect the economic debate in a revealing manner during this period; for example, pointing out that Australia's argument for exceptional treatment in global emission reduction because it wants to continue trading in fossil fuels, is going up against emerging economies who argue that those who have already polluted the globe should pay (Stutchbury, 1995).

Otherwise, the topics dominating articles from 1995–1996 were the spectre of carbon taxes and industry's opposition to them, and Australia's opposition to global mandatory emission reduction targets at the March, 1995, Berlin Conference of the Parties to the UN Framework Convention on Climate Change. Australia had signed the UNFCCC in 1992.

The themes (and some of the influential voices) that came to dominate the public discourse by the mid-1990s can be seen from these excerpts from one 1996 Fin Review article after the Federal Government had changed parties to the Coalition under John Howard. Under the headline "Business Lines Up to Fight Controls", the report says *inter alia:*

> Business has warned the Howard Government to reject international proposals for a raft of new taxes[28] to combat greenhouse gas emissions.
>
> The president of the Business Council of Australia, Mr Ian Salmon, has this week written to the Prime Minister, Mr John Howard, and other ministers calling for a tough stand against accepting legally binding, uniform targets for greenhouse emissions.
>
> The executive director of the Minerals Council of Australia, Mr David Buckingham, wrote to the Minister for Resources, Senator Warwick Parer, registering "strong concern" that a briefing last Thursday was "the first attempt by the Government to engage industry with the detail of the proposed Australian approach to this critically important treaty negotiation".
>
> Mr Howard last night assured the Minerals Council of Australia that industry and non-government organisations would be given proper involvement in international lawmaking on the greenhouse issues … "It will insist that Australia's economic and trade interests are safeguarded and its specific national circumstances are taken into account in implementing the convention."
>
> [*Mr Salmon of the Business Council*] said research by the Australian Bureau of Agricultural and Resource Economics indicated that a harsh approach to industrialised countries like Australia "would have little environmental impact given the unconstrained growth in developing country emissions, especially those of China, India and Indonesia in our region."

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[28] In framing terms, it is worth noting the repeated use of the term "tax" to reflect the carbon price, used extensively in political speeches and media reports from the mid-1990s, and still continuing with the contemporary political rhetoric. Tax evokes a negative and unpleasant impost.

> Mr Buckingham said: "Any outcome from the climate change treaty process that results in a 'ramping up' of existing targets and timetables would be fundamentally contrary to Australia's economic and trade interests."
> (Callick, 1996b)

Other themes of the reframing, quoted in these 30 articles, were: if Australia institutes targets and timetable to combat carbon pollution it would scare investment away; Australia would lose its competitive advantage; Outsiders, Europe and (at that time) the US were doing this type of damage to the country from motives of trade competitiveness and internal politics (in the case of the US); jobs were at stake.

The Sydney Morning Herald (SMH) remained more diverse in emphasis. It continued to produce straight science and risk reports, with similar unambiguous language as in 1990, produced by science journalists throughout the decade. These were particularly prominent around the time of the second IPCC report in 1995, but thereafter more political and sceptical coverage increased. According to two journalists with relevant reporting experience on the SMH and *The Age,* science and environment stories always ranked lower than economics or politics if it came to an editorial choice. Gelbspan (2004) noted this structural feature as well in the US press.

Another former reporter for *The Age*, said that in 1987 when she worked there, environment was low priority and it was a "very blokey" atmosphere in terms of status which favoured state and federal politics, education, and health. She did not recall climate change being an issue during her tenure in 1986–1987, indicating that either the greenhouse issue was still to pick up as it did between 1987 and 1991, or that content analysis must be viewed in each publication separately in the context of its own organisation, or both.

The structural features of the media that influenced the reframing are examined in detail in chapter 7. Also in chapter 7 is the outcome of a quantitative analysis, analysing the SMH samples over time. I found evidence for a significant framing shift to sceptical "balance" aided by a 10-fold increase in opinion pieces in the SMH by 2001 and a shift away from scientists and experts as the primary source of information—all significant influences on the dominant narrative.

The evidence suggests that the greater prominence of green groups as spokespeople for climate change action by the later 1990s in tandem with a focus on jobs, costs and national interest, allowed a rhetorical framing of "us and them" —i.e. mainstream and special interests. However it has been argued by others that environmental groups have been equally intent on maintaining an adversarial role apart from the mainstream, and on advocating narrow legislative and technological solutions (rather than, for instance, alternative job creation), thereby enjoying only sectoral influence within civil society (Shellenberger & Nordhaus, 2005).

At the government level, one manifestation of moving away from the earlier mainstream risk framing was that communication became more technical and boring. An example of this information framing retreat from the direct and accessible language to the narrow and technical can be traced through the content of the federal government's *Climate Change* newsletter published between 1992 and 2000 by the Department of Primary Industries and the Bureau of Rural Resources.

The national broadcaster, the Australian Broadcasting Corporation—which in the early 1990s had led the way with comprehensive science coverage of this issue (former ABC science producer Geoff Burchfield, thesis interview, June 2007)—became increasingly dominated by a conservative board of directors appointed by the Howard Government and largely restricted itself to amplifying government policy (Dempster, 2005). Australia's only national newspaper, *The Australian*, took a largely sceptical stance during the study period and up to contemporary times (Manne, 2011). Analysts have linked this to the strong market fundamentalist opinions of management and connections to free-market think tanks whose members often wrote opinion pieces for the paper (Manne, 2011; Knight, 2005). In chapter 7, parent company News Limited and *The Australian* are put in the context of their influence on Australia's highly concentrated media scene, and in chapter 6 I examine the influential economic ideology manifested in the 1990s by both politicians and the media, setting the dominant narrative agenda .

Influential Framing in Political *with* Media Narratives

The examples I have presented show different ways that the same basic science communication was reframed by different politicians, journalists, and media outlets to form a new dominant narrative, accompanied by an upswing in debate and opinion-focused coverage. The evidence also suggests that the most influential framing was not done by media stories alone, but when there was a confluence between the political and media narratives and across media, as would occur by the time the reframed narrative had become hegemonic in society.

By 1996–1997 the revised dominant narrative was communicated principally via political and economic media workers in the Parliamentary Press Gallery, and reflected the frames set by the business and political elite: climate change was all about a political struggle to get the world to accept that Australia was exceptional—because it traded heavily (with inefficient technology) and offered coal-fired electricity to multinational companies and Australian consumers, as well as being a major coal exporter, and change from this status quo was not acceptable. Those who did not agree—the environmental groups, the Europeans, or the UN—were framed as the opposition to Australia's prosperity enjoyed by the mainstream. In 1997, the prime minister put it this way: "We are not prepared to see Australian jobs sacrificed and efficient Australian industries, particularly the resources sector, robbed of their hard-earned competitive advantage" (Howard, 1997).

Bureaucracy Power Plays and Leadership Style

There were a number of other, institutional, factors that assisted the reframed narrative to take over the public discourse. For example, based on the evidence, I suggest that leadership style had a significant influence on 1990s outcomes. Alternative energy expert Alan Pears, who witnessed the policy transitions from the early 1990s on, said:

> Keating's style was bureaucratic. Climate policy became fractured between 37 committees of bureaucrats … by 1994 a number of the threads started to coalesce that killed off ecologically sustainable development work while industry leaders and most of government thought "supply side" i.e. more energy development (rather than conservation) equals growth and development. (A. Pears, thesis interview, November, 2006)

The federal energy bureaucracy's internal priorities were elsewhere, as noted earlier. A negative effect on climate change response was compounded by interdepartmental battles that led to a stalemate on action after the early study period. Like other insider participants interviewed about the 1990s, John Kerin observed that the native forest debate poisoned relations between the Department of Environment and the then Department of Primary Industries and Energy, and recalled the frustration he felt working with green groups, some of whom he still accuses of lying at the time about forestry issues (J. Kerin, thesis interview, January, 2008). [29] Trade and Treasury were also involved in these battles over the forests. The resulting, and also ideological, antipathy from finance and resource industry bureaucrats to environmental action—along with the resource industry lobbying campaigns documented by Pearse (2005, 2007)—significantly bogged down the early climate change action plans by the mid-1990s under the Keating federal government.

Sue Salmon, from an NGO background, was an adviser to Environment Minister John Faulkner (1994–1995). She also says there was an internal fight going on between the primary industries and mineral extraction portfolios and the environment portfolio by that time, and that forests remained a major focus for the environment movement—unlike climate change —during those years (S. Salmon, thesis interview, June, 2006). Climate change came to be considered a difficult issue to communicate in an ongoing fashion compared to forests. The head of Foreign Affairs and Trade oversaw climate change action proposals by that time and it was all about "the traditional conservative view: we have hundreds of years of coal to trade … It was very 'us and them' and there was a perceived loss of power and face and control by the industry groups to accept the environmental perspective" (S. Salmon, thesis interview, June, 2006). She also recalled that the IPCC was not viewed as an important avenue for information within government.

Other contemporary observers, like scientist Henry Nix, similarly perceived the environment portfolio to be weak. In his experience during the time he was chairing the

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[29] Nix perceived Kerin himself as a perhaps unwitting impediment to the environmental science message at the time, due to departmental rivalry. Kerin was a minister who built a strong industry department, whereas the environment ministers were not so interested or effective at boosting the departmental level (H. Nix, thesis interview, November, 2006).

Greenhouse Advisory Council, Nix said the environment portfolio was generally at the losing end of this argument. "Even on the best days economic arguments always prevailed. It was possible to modify but not change much about it" (H. Nix, thesis interview, November, 2006). This was consistent with the low status afforded environment in mass media.

From the mid-1990s, industry lobbyists abounded under the umbrella group, the Australian Industry Greenhouse Network (fully explored by Pearse 2005, 2007). Salmon said they were very effective talking about jobs and income creation, and Australia's "national interest," while the environment ministry still focused on degrees of certainty (S. Salmon, thesis interview, June 2006). [30]

Underlying these winning rhetorical frames were values and beliefs that elite politicians, bureaucrats, and industry leaders tended to have in common and the dominance of macro economics in all policy formulation. John Kerin, who served as Trade Minister in the early Keating years, recalled:

> Keating and (later Howard government Treasurer) Peter Costello were suckers for dogma on macro economics … The herd instinct (became) 'the market, the market, the market'. In my terms they never examined enough market structure, market power, market failure
>
> One of the things that has always worried me about economics and science, (and I set up the bureau of rural sciences in my department, because all they were concerned about was trade and economics) is that economists are always absolutely sure they are right. Even when they're subsequently proved wrong they just forget about that. Scientists are never absolutely sure they're right because they always know there's more discovery and we learn more and more (J. Kerin, thesis interview, January, 2008).

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[30] Working more recently with the Carr Labor government in New South Wales, Salmon said she noticed a similar weakening split within government ranks with the then Premier Bob Carr understanding the science, but the Treasurer Michael Egan blocking and presenting arguments as a sceptic and economic rationalist.

While Salmon battled in the trenches of Parliament House, Phillip Toyne had been drafted from the leadership of the Australian Conservation Foundation to head the Environment Department in 1995. He said looking at some ice core research in Antarctica "woke him up" (P. Toyne, thesis interview, August, 2007) but that generally neither NGOs nor government had climate change at the top of the agenda in the 1990s. Environmental and scientific submissions might prevail to a certain degree, but only for a short while. In his view there was "a major disconnect between what scientists knew and their ability to influence policy [and this was due to] internal CSIRO traditions that did not promote a lot of communication with policymakers" (P. Toyne, thesis interview, August, 2007).

By the time Toyne headed the department (and continued for two years under the Howard Government) he found the Greenhouse Advisory Council (the scientific advisers) to be "invisible", certainly not wielding any direct influence. Toyne agreed that the roundtable ecologically sustainable development (ESD) process (during the Hawke/Richardson leadership on environment matters in federal government), was a prime example of how the environment generally and climate change had been treated as "mainstream". But by the mid-1990s, with the industry lobbyists in full swing, the federal government was treating climate change knowledge as a "niche environmental" issue.

Toyne and others noted that after Keating became Prime Minister in 1991 he did not intervene when the early, prominent work on climate policy and emission targets became disputed between bureaucracies and committees. *The Sydney Morning Herald* also reported:

> So far the opponents of the targets have employed the favourite trick of the bureaucrat—delay—to bog the whole process down in a myriad of inter-departmental committees, studies and consultancies. The three ministers with central responsibility to implement the changes to reach the target—Kerin (now Crean), Beazley and Button—were asked by Cabinet last October to report back by the end of last year on "recommended implementation measures". Nine months later and there is little sign of them rushing back to Cabinet (Burton, 1991, p. 32).

In these ways, political leadership style—along with leadership intent—and bureaucratic beliefs and values appear to have played key roles in framing how to think about climate change at the national level in Australia from the Hawke through to the Howard governments. The leadership and bureaucracy facilitated a swing back to traditional and status quo policies in regard to the environment and government responses, consistent also with the theory of ecological modernisation.

ESD EXPERIMENT: FROM KEY REFORMS TO POLICY SIDELINE

In the context of evolving climate change policy and framing, the fate of the national Ecologically Sustainable Development (ESD) process and analyses demonstrates how the same scientific and economic data can lead to widely divergent policy recommendations and framing—compared with the analysis of the Industry Commission that eventually prevailed. It also shows what can happen to good ideas or programs without the leadership to ensure they survive. However, ESD as conceived also operates within the paradigm of ecological modernisation, with the expectations of conventional development. ESD's eventual sidelining indicates the difficulties of partial change, let alone radical revision of modern industrialisation and the institutions it relies on.

The ESD process, at the time a global concept, was put into practice by the Hawke Labor government's 1989 decision to involve governments, industry, environmental, and community representatives in working groups considering how to achieve ecologically sustainable development within nine sectors of the economy, including resource and energy use. ESD was to consider community well-being, intergenerational equity, global impact, protection of biodiversity, and ecological processes along with economic development (Harris, 1997). For the purposes of this thesis enquiry, the important aspect was that the ESD experiment was inclusive of the natural environment and its spokespeople—reflected in the ESD analysis and framing.

A combined ESD working group was asked to recommend how to lower carbon emissions from the energy sector. Its priority recommendation was to focus on efficient energy use, thereby also lowering costs (demand management) (Bulkeley, 2000a; Diesendorf, 2000). This could be done by advocating or regulating smarter ways to operate in residential, commercial, and transport sectors: substituting gas for electricity,

using insulation, efficient motors, and better construction and planning, as well as changes in the agricultural sector to create greenhouse sinks (more recently called bio-sequestration). According to former science minister Barry Jones, "[This] approach begins with the assumption that something can be done, that the argument 'this is the way we have always done things around here, and it can't change' is unnecessarily pessimistic" (Jones, 1992, p.7).

Bulkeley (2000a) commented that the 500 recommendations that emerged from this ESD assessment did not challenge the basic assumptions of modern industrialisation and "growth" (ecological modernisation). The degree of consensus, however, including from business and NGOs, may have surprised some. In the event, it proved too radical a process to last. Bulkeley reported that while it was generally seen as progressive and consensual, Australia's elite decision-making tradition emerged to drive the outcomes. This was achieved by the federal government developing the initial discussion paper and terms of reference, by the numerical preponderance of bureaucrats in the working groups, and through the government's selection of the stakeholders from industry, environment, and community groups.

The energy sector report was taken "in house" where interdepartmental and intergovernmental committees whittled down the recommendation list to form the basis of the National Greenhouse Response Strategy (NGRS) and the National Strategy for Ecologically Sustainable Development (NSESD). "The resulting draft NGRS bore few similarities with the conclusions of the working group, representing instead a 'lowest common denominator' approach as to what governments and bureaucrats were prepared to accept" (Bulkeley, 2000a, p. 42).

This experiment in participatory democracy in policy formulation ended in discord and disarray. The national Institution of Engineers, not known for its radicalism, issued a press release in August 1992 condemning the process, saying: "According to the Institution, bureaucratic arrogance in the National Greenhouse Steering Committee (NGSC) has produced a National Greenhouse Response Strategy (NGRS) which encourages procrastination on all actions—even on those measures which are well-proven as being cost effective" (Dack, 1992).

The response themes that would come to characterise the 1990s were evident in the national strategy that Dack criticised: delay, more research, voluntary action and rejection of demand management and mandatory efficiency measure—and a disregard and eventual burial of the national planning target for emission reduction.

TRIUMPH OF THE ECONOMIST WORLD VIEW

The ESD recommendations for energy management were in response to a request for input, along with a similar request to the Industry Commission, by Treasurer (soon to be Prime Minister) Paul Keating on the costs, benefits, and opportunities of the government's draft emission reduction target. The eventual triumph of the Industry Commission assumptions and world view would direct a decade of responses to the scientific information about climate change and frame the public discourse. Contemporary observers quoted by Bulkeley (2000a) believed that the simultaneous Industry Commission analysis of costs and benefits came to dominate the responses suggested in the National Greenhouse Response Strategy.

Former Science Minister Barry Jones candidly compared and contrasted the ESD and Industry Commission reports on costs and benefits of greenhouse action commissioned in 1991 (Jones, 1992). He showed that in many ways the two analyses mirror a "can do" versus a "can't do" view of effective response to climate change. The "can't do" framing (because it is against the national interest) eventually came to dominate the public discourse through the narrative set by politicians and the media, and helps explain how Australia lost a decade of valuable time and related public knowledge by 2001. What I call the dominant narrative becomes "normal", and in this case shifted to an adversarial political story with Australia as the victim of outside forces.

The "can't do" narrative may have been aided by the fact that, after the plain-English 1990 IPCC report, many climate scientists were starting to take a more cautious public stance (stressing uncertainties) in response to attacks and also perhaps because that was a more conventional response for a scientist. Changes were reflected in scientists' own language and these influences are discussed in following chapters.

Industry Commission and rise of the "costs" narrative

The Industry Commission, a premier research organisation for the Australian government, initiated its inquiry in January 1991 with public hearings and submissions from "interested parties", a common Australian practice. The Commission reported in November of that year (Industry Commission, 1991). Given the "business as usual" and growth assumptions it entered into its modelling, the Commission found there would be a heavy cost to Australian industry if emissions were corralled to the degree suggested by the October 1990 emission reduction target of stabilising emissions at 1988 levels by 2000 and reducing them 20% from there by 2005. This would require some changes from the status quo of Australia growing as a "raw materials economy" and affect existing industries like coal and oil (Jones, 1992).

Former Science Minister Barry Jones called the Commission's approach "rigid" and wedded to recurrent ideas of the nation's "comparative advantage" as a quarry to developing countries, as well as the more recent idea of making Australia a base for the multinational aluminium industry, with enticements of cheap coal-based electricity. It was noted in contemporary media reports that the Hawke Government was keen for this to happen rationalising that the coal was "low sulphur". A SMH article pointed out that this view was not unanimous in the federal Cabinet. "That argument [to entice industry to Australia with its coal-based electricity] has potential merit, except that, as (Environment Minister) Mrs Kelly points out, Australia has the least energy-efficient industrial sector of any OECD nation—that is, it must burn more fossil fuel to achieve a given industrial output" (Seccombe, 1990a, p. 15).

An inefficient industrial sector in an export environment helps explain the cost assumptions for the Industry Commission, whose findings of cost and hardship supported the reframed dominant narrative discussed in this chapter. The "we'll be ruined" refrain should the energy status quo change, became a familiar theme in climate change communications as the 1990s progressed. Pearse (2009) also noted that Australia during these years made fundamental choices not to have a diversified economy, thereby limiting its response options.

The Industry Commission issues paper foreshadowed several other thematic shifts as the 1990s discourse progressed—eventually away from the frame that there is a global ethical responsibility and toward the frame that the global atmosphere is a "commons", and no one nation can have significant impact unilaterally "if in doing so this

significantly damages their economies or international trade competitiveness" (Industry Commission, 1991, p. 5). Oft-repeated thereafter, was the threat that if Australia acts against major industry emitters, they will simply move offshore (Industry Commission, 1991, p. 12)[31]. With these frames, the Australian discourse came to illustrate Garrett Hardin's classic thesis of the "tragedy of the commons"—where an entity is unwilling to unilaterally look after the common interest, thinking that others will not.

The Industry Commission initiated economic modelling that influenced other government advisers, particularly the Australian Bureau of Agricultural and Resource Economics (ABARE) and its industry clients. The modelling of costs to the economy provided the political arguments for not ratifying the Kyoto Protocol to set global emission reduction targets after 1997. The underlying assumptions that trumped the ESD recommendations on efficiency and alternative energy mixes—according to Bulkeley and Hamilton—is a worldview about markets, their inherent perfection and efficiency, and thus the anathema of regulating economies or even offering incentives for change. This ideology was economic rationalism as practised in Australia, a major influence on response that is explored in chapter 6.

In his analysis of what he calls "idealist economics"—that is, theory and policy divorced from empirical data—political economist Evan Jones cited the work of the Industry Commission as a prime example of a certain type of economic modelling and analysis using "a preconceived conceptual framework" to learn the likely impact of policy change (Jones, 2002). Arguably, ABARE's 1990s analyses were similarly idealised. Pearse (2007) interviewed insiders and described how assumptions favouring status quo industries and the likely cost of any change were seeded into economic modelling of the mid and late 1990s. This has been variously ascribed to ideology or consultancy payments from industry, or likely both. "For ABARE, Australia's big polluters are in fact clients. Many of them have paid vast sums for ABARE's greenhouse policy research. The terms of these deals are commercial in confidence, not even revealed in parliament …"(Pearse, 2007, p. 219).

Pearse wrote that the biggest names amongst Australian fossil fuel companies figure in parliamentary revelations of clients who funded the ABARE model that underpinned

[31] Readers may have noted that the very same warnings, cautions or threats of economic damage have continued beyond the study period, i.e., after 2001, in the dominant narrative reported in the mass media.

PM John Howard's climate change response after 1996. These include the Australian Coal Association, Australian Aluminium Council, the Business Council of Australia, BHP, Rio Tinto, Exxon Mobil, and other oil companies. This process generated enough controversy to merit an auditor-general's investigation in the late 1990s, which showed no environmental lobbyists were on hand to wield comparable influence (Pearse, 2007).

Australia as a Good Global Citizen

Through the early Keating years, Australian politicians were still keen to be seen as good global citizens. Indeed, McDonald (2005) makes a persuasive case that an ethical politics, at least in foreign policy, was still at the time deflecting the inroads of economic rationalist thought.

In June 1992, Australia was a signatory to the UN Framework Convention on Climate Change (UNFCCC) unveiled at the UN Conference on Environment and Development (also known as the Rio Earth Summit). The UNFCCC came into force in 1994. Australia became the eighth nation to ratify the convention, signalling its serious intent. The UNFCCC called for emission reduction of greenhouse gases to 1990 levels by 2000, and targets would be set in 1997 at the Kyoto meeting of the parties to the convention (the Kyoto Protocol). Meanwhile signatories were also supposed to design effective response strategies (Bulkeley, 2000a; Hamilton & The Australia Institute, 1997). Australian states were already doing that in response to the early good public knowledge in this country and the global and domestic emission reduction targets.

Project Victoria

All Australian states reported in October 1991 on what had been achieved since their mission statements in 1988 (ANZECC, 1991). Victoria is the premier example of how far climate change response programs had progressed and what happened thereafter. At the beginning of the 1990s, Victoria was leading with a comprehensive suite of actions including: mandatory insulation in new housing; permanent controls on tree-clearing; incorporating the costs of environmental damage by "providing a 10 percent cost advantage to energy conservation and renewable energy resource options"; and (soon to be disbanded by deregulation and privatisation) major demand-management programs through the State Electricity Commission of Victoria and the Gas and Fuel Corporation

of Victoria. All this would require "a policy of energy conservation rather than increased sales" (ANZECC, 1991, p. 38).

The Electricity Commission figured that its programs—targeted at residential, commercial, and industrial consumers—could save 14 million tonnes of greenhouse gas emissions annually while reducing demand, thereby saving consumers money, up to the year 2005 (i.e., 14 years hence). However, nationally as I have shown, the Industry Commission, and later ABARE modelling, would disregard the possibilities of demand management in favour of incremental growth in demand and costs. The Renewable Energy Authority of Victoria was taking even bolder steps to finally crack the builder and subdivision mentality with guidelines for solar-efficient subdivisions to be incorporated in the building code; house energy efficiency ratings; labelling for solar hot water heaters, wind farms, methane recovery at landfills; and more (ANZECC, 1991).

All this was to come to a dramatic halt with "Project Victoria", which brought a Liberal government led by Jeff Kennett to power in 1992 with the help of a "blueprint" for a deregulated state drawn up by the neo-liberal think tank the Tasman Institute (Cahill and Beder, 2005). Kennett would lead these "reforms" until 1999. Ideology was thus shifting the goalposts at both the state and federal levels.

Deregulation of state energy utilities following 1992 (aided by the Keating government's enthusiasm for national competition policy) helped undo both the intent and the capability for reducing Australia's emissions through energy demand management strategies. Victoria was not alone in planning energy sector efficiency management. But deregulation and commercial competition in the energy sector favoured increasing revenue through increasing demand, the opposite of demand management. The response from the other states varied. In some cases, some conservation programs did remain for the longer term. For example, New South Wales created its Sustainable Energy Development Authority (SEDA) that promoted green power electricity and energy efficiency into the 2000s (Diesendorf, 2007).

Bulkeley (2000a) and others (notably Wilkenfeld, Hamilton & Saddler 1995; Hamilton, 2001) have critiqued the inherent weaknesses of the National Greenhouse Response

Strategy (NGRS) of 1992. Economists Wilkenfeld, Hamilton and Saddler at the Australia Institute wrote in 1995:

> The failure of the NGRS derives from a failure of governments to show leadership, to reconcile conflicting policy objectives and to distinguish the public interest from narrow commercial interests. This has been compounded by a lack of knowledge of the energy market in parts of the bureaucracy, and a lack of informed public debate and scrutiny. (p.1)

The Advent of Cost-neutral Voluntary Action

In a 2000 review Bulkeley noted: "Responses were left to ad hoc government processes and commercial decisions," (Bulkeley, 2000a, p. 45). The strategy established a rhetorical framework that response should be left to individual action and be "no regrets" (i.e., no entity should bear costs) which became firmly established in the public discourse and assumptions of the possible.

In that spirit, the showpiece of federal government action by 1994 became the Greenhouse Challenge Program targeted at voluntary industry efficiency measures, and administered jointly by the departments of environment and industry. It reflected the federal industry department's decision not to compromise growth and development on behalf of greenhouse gas abatement goals, regardless of international commitments (Bulkelely, 2000a, p. 47). Wilkenfeld, Hamilton and others have described the Greenhouse Challenge program as a model of how to tackle a pressing national problem in an ad hoc, voluntary fashion—rather like asking citizens to voluntarily tax themselves for the public good.

It reflected the ideas behind most climate change response activities by the federal government in the later study period until 2001 and beyond: that "the market" knows best on all things. A carbon tax, an effective tool in a market economy, was considered and nevertheless rejected during the mid-1990s as too costly to industry (Hamilton, 2002). The resource industry's role in opposing any climate change response that cost money or profits is evident from *The Australian Financial Review* newspaper evidence discussed earlier in this chapter.

A national conclave, Greenhouse 21C, talked about funding renewable energy and a national sustainable energy policy, but there is no evidence it ever moved coherently beyond the intent stage. By 1994–1995, it was clearer that Australia would be overshooting the FCCC aim of reducing greenhouse gas emissions to 1990 levels by the year 2000 (let alone the earlier domestic interim target of 20% below 1988 levels), and therefore Australia would not be meeting its international commitments or indeed implement much of the NGRS (Bulkeley, 2000a, p. 47; Hamilton, 2001).

By mid-1995 the federal government had formally aligned itself with the so-called "Juscanz" countries—standing for Japan, US, Canada, Australia and New Zealand. At least one major environmental organisation blamed the US, Canada, and Australia in particular for obstructing a whole raft of environmental measures agreed to at the Earth Summit, including moving ahead on reducing greenhouse gas emissions (Greenpeace, 2002).

While Australian scientists remained involved at the IPCC level, and the scientific message remained similar, the 1995 IPCC report would be a cautious shadow of the 1990 report in communication terms. Reasons proffered by various observers have been: behind-the scenes politicking by oil and energy producers and their support for sceptic scientists; the need to build consensus amongst government panel members; and possibly the influence of economists as panel chairs. In chapter 9 I compare the language of the two reports as evidence of a big shift in scientists' communication style.

Australian National Party politician John Stone approvingly noted in an opinion piece in the Fin Review that the 1995 IPCC report was only "40 percent as apocalyptic" as its 1990 counterpart. In doing so, he said he echoed the sentiment of US sceptic scientist Patrick Michaels. At this rate, Stone hoped the whole lot of "poppycock" would disappear by the end of the decade (Stone, 1996, p. 25).

The evidence examined for this thesis supports Bulkeley who concluded in her review covering 1985–1995 that despite the brief window of opportunity to bridge economic and environmental objectives, climate change policy by the mid-1990s "appears to represent a throwback to the previous era of confrontation" (Bulkeley 2000a, p. 48), signalling the failure of the ESD experiment and of a precautionary approach.

The Reframe from 1996 On

The dominant narrative was well on its way to changing from a "science and risk to society" story to a political and economic story about costs and "national interest" as the Howard Coalition government took office in March 1996. A good overview of this trend and related communication can be seen in the 30 Fin Review articles scanned for 1995–1996. They provide clear evidence of the strong economic focus that continued through 1996–2001 (and beyond). The following article makes manifest the government's identification with resource industry interests, and the language is typical of the later study period. (Comparisons can again be made with the language of an earlier, 1990, Fin Review article by Michael Stutchbury, in Appendix 1, also a typical example from its time.) Headlined: "Coalition Backs Industry on Climate Change" the 1996 story reports that:

> Australian industry has applauded the Federal Cabinet's decision yesterday to oppose a targets and timetables approach to international climate change negotiations, made on the eve of World Environment Day today. The Howard Government's position effectively reaffirms that taken by the Keating government and its minister for the Environment, Senator John Faulkner. The Minister for Foreign Affairs, Mr Alexander Downer, the Minister for the Environment, Senator Robert Hill, and the Minister for Resources and Energy, Senator Warwick Parer, said in a joint statement: "Australia will insist that the outcome of current international negotiations on climate change safeguards Australia's particular economic and trade interests."
>
> Mr John Hannagan, chairman of the Australian Aluminium Council's major policy group, said industry welcomed this statement, "reinforcing its no-regrets position as its negotiating stand at the forthcoming Geneva talks." He said: "This is consistent with the Government's commitment not to support mandatory policy measures which would damage Australia's trade and economic interests. We would also ask the Government for stronger efforts to involve developing countries in the process at the earliest possible opportunity."
>
> (Callick, 1996, p. 2)

Pearse (2007) put public relations consultant John Hannagan and his partner Noel Bushnell (H&B) in context:

> Some of Australia's biggest polluters have paid H&B for much of the decade to attend international greenhouse negotiations, write media strategies and press releases, organise conferences undermining Kyoto along with the rationale for emission cuts. Most important of all, polluter money has funded H&B to door-knock the Prime Minister's office (Pearse, 2007, p.209).

Compared with the early study period, few government or public documents (other than newspaper reports) were found discussing greenhouse science communication from the mid-1990s and up to 2001[32]. However, a significant shift in framing the issue can be gauged from a July 1996 document called *Greenhouse, Not Just an Environmental Issue* produced by the Australian Coal Association. The framing in the introduction to this document is notable because it reflects the "uncertain" way of communicating climate change in the public discourse that took hold during that period, as reflected also in newspaper reports and politicians statements.

The coal industry document said the Australian public was being told by the media and by environmental groups that fossil fuels are to blame for heating the planet, but a more balanced and objective debate is needed. It also picked apart the 1995–1996 IPCC report to highlight any language signalling uncertainty about human activities affecting the climate, and included contradictory sceptic perspectives. The report highlighted Australia's "competitive advantage", and called Kyoto target setting unfair. The framing implied the question: Whether, and to what extent, is there a human influence on the greenhouse effect so that action is necessary? As I have shown, in the early study period, reports by media and government, and even industry, assumed that this had been thoroughly answered by science.

After 1996, climate change or the greenhouse effect would be commonly presented, in the media and in political rhetoric, as a "debate" about both the science and about Australia's place in the world in terms of action. Some of this can be seen in the

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[32] The most complete record, in the federal government's *Climate Change* newsletter, indicates a retreat into the technical and boring and away from policy reports. However, the federal government's Greenhouse Office website may have been an anomaly, at least in the period following 2001 when this thesis started, by exhibiting no uncertainty about the science and human agency.

November 1997 speech by the new Prime Minister John Howard on climate change. It lays out the economic and jobs argument for Australia's position and barely, if at all, mentions the science, the risk, and the need for a vigorous response. "From the start the Government has addressed the critical issue of global warming in a way that effectively promotes Australia's national interests". The speech rejects mandatory targets and talks about jobs, efficient industries and competitive advantage (Howard, 1997).

Hamilton (2001) notes that this perspective to climate change response, along with an industry fixation to avoid a carbon tax, guaranteed that the on-ground action would be slim to none despite rhetoric about "leading the world" on this and that response initiative. Indeed, there is nothing in the documentary record of this period analogous to the federal and state activity record of the late 1980s and early 1990s I have previously outlined. McDonald (2005) agreed that effective action was minimal in light of the policy directions, and adds that there was also a "vicious attack on the environment movement" mounted during this period (McDonald, 2005, p. 225).

Claims Australia Encouraging More Emissions

Further evidence on the extent that both major political parties had, by the mid-1990s, rejected the early government response framework, in favour of framing to strengthen the status quo and delay action, was provided in an extraordinary letter. This was sent by a political party, the Australian Democrats, to a climate summit meeting in Geneva in 1996 and reported in the SMH thus:

In the letter, the Democrats told Mr Chimutengwende [the meeting chairman] that while the Howard Government might claim Australia's greenhouse gas emissions would miss the target of halting their rise by only 3 per cent, in fact Australia's greenhouse emissions were rapidly increasing and almost all of the National Greenhouse Response Strategy remained unimplemented.

"The Government is actively encouraging more coal-fired thermal power stations; it does not have the commitment to stand up to the coal industry hence its contradictory attempt to assist marketing coal in the name of greenhouse gas reductions," the letter says.

> "The Government actively encourages more car use by building more freeways and infrastructure to support it rather than improving public transport; it allows far more clearing of native vegetation than is being replaced by tree planting; it increases the number of forests clearfelled for woodchips and it does not adequately encourage development and implementation of renewable technologies." (Gilchrist, 1996, p. 2)

McDonald (2005) studied the change in Australia's value emphasis during this period and concluded that a major shift occurred away from a stance that was global, ethical, and risk averse (and open to new energy industries). He notes that Australia's refusal to ratify the Kyoto Protocol by the late 1990s created a "context" (or a meta frame) where the refusal was communicated by politicians and the media as normal and logical behaviour to protect jobs and the national interest. Meanwhile, a significant narrative arose, aided by sceptics, in the second half of the study period that "scientists don't agree" and that there is significant uncertainty about the science. The considerable influence of scientific micro framing about certainty is examined in chapters 8 and 9.

A related phenomenon by the mid 1990s was the incremental marginalised role of environmental concerns and the institutional downgrading of public interest science in favour of conducting taxpayer-funded science on behalf of industry. Graeme Pearman, former chief of the CSIRO Division of Atmospheric Research from 1992–2002 was an acting CSIRO Institute Director in 1996. He recalled that there was "enormous tension between the mining institute and the environment institute which was considered 'too green'." CSIRO was balkanised. "The CSIRO Board also became industry dominated" (and) "The paradigm was wealth creation and the role of science is to build wealth…[this manifested as] denial or that it was politically incorrect to diverge from 'accountability' towards this path" (G. Pearman, thesis interview, 2006).

Through his role as a science communicator as well as administrator, Pearman says that he found the business community had unspoken but adhered-to rules of how it regarded the schism between development and environment or green issues. Even within the scientific community, climate change had become characterised as a special interest "green issue" and he became characterised as a "greenie" by the mid 1990s—a far cry from the early scientific mainstreaming of climate science through his efforts and that of other CSIRO scientists in 1987 and 1988. This state of affairs was not helped by the

fact that "people in boardrooms and cabinets don't understand 'science speak' on uncertainty" (G. Pearman, thesis interview, 2006).

A significant event towards the end of the study period, in April 2000, was the inaugural meeting of the Lavoisier Group of sceptical entities, co-led by the highly influential and active Hugh Morgan and Ray Evans of the Australian Minerals Council. It was reported at the time (Taylor, 2000) that the Lavoisier Group was a spin-off of members from the Australian Business Council who wanted to take a step backwards to dispute the very existence of an anthropogenic greenhouse effect. They were joined by engineers, academics, free market consultant Alan Oxley, and retired government officials—some with considerable clout like retired Labor Minister Peter Walsh, as well as Brian Tucker, former head of CSIRO Atmospheric Research—all of whom set about contacting politicians (The Lavoisier Group, 2000).

The express aim of this group/think tank was to debunk, sow uncertainty and otherwise counter the science and policy responses of climate change in the lead-up to possible Kyoto ratification in 2005. In 2004 the group published a sceptic book penned by former Bureau of Meteorology staffer William Kininmonth that raised desired media attention and debate. This thesis notes that publication of sceptical books at critical policy junctures has been a repeat tactic by climate change policy critics. In the event, Kyoto was not ratified by Australia at that time.

However, internationally by 2000, the fossil fuel industry sceptic Global Climate Coalition, which had attempted to overwhelm IPCC and political negotiations during the 1990s, was reported to be falling into disunity. A better understanding was emerging amongst key global energy corporations like Shell and Texaco, and car companies like Ford and others, that they should consider the risks and opportunities posed by climate change, not just act as blockers (Windram, 2000).

DECLINE OF PUBLIC INTEREST BY MID–1990S

The Australian documentary evidence does not state explicitly what the ongoing public reaction to climate change information was during the mid–to later 1990s. However, Nisbet and Myers (2007), looking at US poll data, showed that public interest can wane considerably as a story is reframed from a science to a negative political story, as it was

during these years. Some suggestive data were released by the Australian Bureau of Statistics in 2006, showing public concern for environmental issues had declined continuously since 1992 when 75% of Australians expressed interest. By 2004 that figure had dropped to 57% (Beeby, 2006).

Since this drop coincides with the reframing period in the 1990s on climate change, it may reflect a loss of public awareness or interest in that arena as well as on other environmental issues, and perhaps for similar reasons of political diversion. Based on the communication analysis for this thesis, I consider it less likely that the loss of public interest came first and influenced the politicians and media to cloud the climate change discourse. McDonald (2005) notes that the literature of the period confirms the influence of the environment movement waned during the 1990s. As well, McDonald notes the campaign of deliberate marginalisation of environmental groups and issues after 1996.

CONCLUSION

By the mid–1990s Australia had reverted to a more traditional paradigm of confrontation between economic and environmental interests. Additionally the documentary record shows that Australian federal political leaders, while well-informed and committed to action in the period 1987–1992, were even then hedging Australia's response options. This is viewed in the context that Australia decided by the late 1980s to focus the economy on being a mineral extraction centre (some people call it a quarry), including becoming globally a top coal producer and exporter, and courting energy-intensive industries like aluminium to establish here (Stutchbury, 1990).

History and government scholars (e.g., Mercer, 1991; Pearse, 2009) provide a context for this shift backwards in economic and political focus to Australian traditional values of "developmentalism" and a focus on growth first and foremost within known industries: i.e. Australia's traditional role as a raw resource economy—now in a "free" and globalised market. Significant influences on this shifting policy framework are explored in the following chapters to offer greater detail on the values and institutions that drove Australian events to evolve as they did over the decade of the 1990s.

The evidence gathered for this chapter and the previous one shows how communication framing concurs with Bulkeley's (2000a) analysis that there was a brief, early window of opportunity for a positive and effective policy response to climate change science which swung shut in favour of traditional values. In particular I show how the communication supported considerable activity by Australian governments between 1987 and 1992 and then changed. In the context of the events and leadership changes in the 1990s, I am able to identify some fairly clear communication frames that evolved from the early "can do" response to the later "can't do" response on understanding and action.

The shift was from an ethical, global responsibility and mainstream risk management narrative to a narrative of national self interest identified with multi-national resource extraction industries, costs, and threat to jobs. An "us and them" theme developed against international agencies like the UN and also the European Union. This stance also marginalised environmental groups, and possibly climate scientists along with them. The science became framed as uncertain. "Outsiders" and international forces were framed as trying to use this uncertain science to destroy Australian families' prosperity. The Australian federal government on the other hand was framed as safeguarding jobs, families and the "national interest" by rejecting international emission reduction targets and perspectives that were not about the economy.

This dominant narrative became "normal" in the late 1990s and beyond and the consequences of these frames are visible in the difficulty of shifting the narrative back to a mainstream risk concern in the present day. It is possible to isolate some key communication frames of the early and later narratives as shown in the comparative columns in Figure 8.

Figure 8 Frames and Drivers of Early and Late Climate Change Dominant Narratives and Discourses

EARLY FRAMING	LATER FRAMING
• Scientists' voice clear and accepted by media and bipartisan political leadership	• Scientists voice uncertain; scientists don't agree; scientists not communicating
• Mainstream messages that all are equally at risk in our family/nation/world; weather a key driver to public awareness	• "Them" the greenies/UN/Europe interfering with our prosperity, scaring investment away
• Environment on equal footing in the national discourse	• Environmental issues and groups marginalised
• Australia has amongst highest per capita emissions and should take a leading role in global action	• We're exceptional on the global stage; if we don't pollute, sell coal, others will; we won't take action on this 'commons' until all other countries do
• Policy framing of national interest is ethical, responsible as global citizen; change and efficiency in energy policy = opportunities, cleaner environment, new jobs, less cost to consumers	• Policy framing of national interest equated with multinational resource extraction industry; any change in energy policy = more costs to consumers, less jobs, benefits not factored in
• Understanding that early action will mitigate severity of future climate change and harm	• There will be a techno fix down the road, clean coal, nuclear
• Some regulation may be necessary to fast-track response strategies	• Any changes have to be voluntary "choice" of business and consumers
• Political and media leaders tell us this, so we agree	• Political and media leaders tell us this, so we agree

CHAPTER SIX

FRAMING THE DOMINANT NARRATIVE—INFLUENCES I: VALUES, BELIEFS AND POLITICAL ECONOMIC IDEOLOGIES IN FRAMING THE POLICY AGENDA AND RESPONDING TO THE SCIENCE

> *An implicit and almost universal assumption of discussions published in professional and semi-popular journals is that the problem under discussion has a technical solution. A technical solution may be defined as one that requires a change only in the techniques of the natural sciences, demanding little or nothing in the way of change in human values, ideas or morality.*
> Hardin, *The tragedy of the Commons* (1968), cited in Dryzek & Schlosberg, 2005, pp. 25–36.

> *[Prince Charles] has long called on people and politicians to rethink their attitudes to the planet, economic growth and consumption. Recently, however, government policy has become based on the notion that problems such as climate change are best addressed through science and technology – without compromising economic growth and consumerism.*
> "Greenie Charles Worries Labour," 2009

INTRODUCTION

Ideas: The Meta Influence

In previous chapters I have looked at the theory and practice of framing climate change information by scientists, government, and media and how this communication changed dramatically during the span of the study period. I have discussed the arc of climate change policy events in Australia during the same period, and the suggestion that it reflects the theory of ecological modernisation—that all actions on behalf of the natural environment can be accommodated *without* changing existing social structures or aspirations. On both these fronts then, that is, communication and societal framework, it is arguably important to understand the ideas that drove the opinion leaders who set the dominant narrative for the public, not least because present-day evidence shows that the same influential frames are still in use.

For example, in late 2009, in the lead-up to the Copenhagen Climate Change talks (the 16th Conference of the Parties to the 1992 UN Framework Convention on Climate Change [FCCC]), work by an international consortium of investigative journalists, including members of *The Sydney Morning Herald* (SMH) staff, unveiled the ongoing and highly funded public relations campaigns by coal, aluminium, and electricity industries and, at times, related labour unions, to influence and deflect government action (*The global climate change lobby*, 2009). The lobbying story, even some of the players, were the same as previously explored by Pearse (2007) looking back at the 1990s. The tactics were also familiar. Elite opinion-makers in politics and the media framed a dominant narrative for their arguments in terms of jobs and family, and of employers going offshore if their needs for cheap power were not met. In framing terms, this narrative made the economic interests of multinational companies synonymous with the national interest and metaphorically with every family's interests. This chapter therefore looks at the influence of ideology in the ongoing narrative and the next chapters will further explore the role of the media, and also the contributions of scientists own beliefs and values in this framing/reframing process relevant to public communication of climate change.

Political science researchers and the present study have established that lobbying by business and labour interests converged with political ideology and media structural factors to reframe a dominant narrative in the 1990s and drive the outcomes of climate change policy. In the face of increasing risk of climate system catastrophe according to scientific reports, this raises the question: Have influential opinion-leaders in these sectors behaved irrationally during the past 20 years and do they continue to do so? How can they deny the risk and subvert action in face of the overwhelming scientific evidence that is now empirically more evident year by year?

From another perspective, many people seem to believe that politicians and their advisers are unable to think past the current or next election cycle. For them, questions about what values drive policy-makers in regard to the long-term implications of climate change risk often founder on this one idea. This explanation has been offered in interviews by senior public servants and former politicians, as well as by academic observers. That is the end of the story as far as they are concerned.

The hypothesis developed with the current study is that there are underlying and shared values and beliefs held by politicians and other influential opinion leaders that make their responses internally congruent, if not always "rational" or understandable to the casual observer. These values and ideas become reflected in society at large (the concept of hegemony). The influence of dominant ideas and values on environmental and climate policy is therefore further explored in this chapter.

"Discourse" in this exploration refers to both the content of public and political debate guided by ideas and beliefs, and also to the practice of public discussion.[33] "Ideology" is used in the traditional political science sense of bodies of thought and belief e.g., Marxism or liberalism. As a science communication scholar, I am borrowing from the social sciences for insight into guiding beliefs and values in the period of interest (late 1980s to 2001). This thesis and chapter do not attempt to provide a comprehensive overview of the literature or theory pertaining to political or economic philosophy, guiding beliefs, or cultural value systems (or about risk perception and psychology), but offer the insight that these are important areas worthy of investigation in science and society studies.

BACKGROUND

A comprehensive literature review of the leading thinkers on environmental politics, influential during the period under study, can be found in Dryzek & Schlosberg (1998, 2005). In regard to neo-liberal economics in Australia and the discourses it has generated, a good overview of recent Australian research directions is provided by Johnson (2002). Mercer, examining natural resource conflicts in Australia, argues that while in Australia the "environmental debate" has been conducted predominantly by invoking scientists and technologists of various stripes, the insights of the social sciences and humanities have to be given equal weight because "Environmental questions are inextricably intertwined with economic issues and, at base, are concerned with values rather than so-called 'scientific facts'" (Mercer, 1991, p. ix).

Historically and psychologically, the denial of environmental reality is not a new phenomenon for the human species. Diamond (2005) looked extensively at the collapse

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[33] Others have referred to discourses as shared ways of interpreting the world: also calling them frames, speech genres, and interpretive repertoires (e.g., Tuler, 1998, reviewing Dryzek, 1997).

of previous civilisations and says the evidence indicates that, more often than not, it has been the values and beliefs of societal elites more than any empirical on-ground evidence (frequently of changing climatic conditions) that has determined the fates of these civilisations.

The proposition that values guide much of environmental policy development and communication takes the story beyond a saga of corporate self-interest from potential "losers" *vis a vis* national climate change response in the energy sector. Facing the environmental sciences during the study period (from the late 1980s to 2001 and beyond) have been deep-seated ideologies that, I will argue, came to exercise a hegemonic grip on Australian society. Gramsci's theory of cultural hegemony postulates that in advanced industrial societies, one group or class can rule through dominating everyday ideas and practices, and this is done through information—e.g., mass media and public relations, schooling, popular culture, and consumerism.

In Australia, commonly held ideas and values include a "no limits" view on human capability versus the natural world. There are abiding beliefs in growth and progress (also described as "developmentalism" in the literature) as guiding principles in the organisation of society; plus related beliefs in the power of technology to fix all problems (eventually); and deeply embedded beliefs in human exceptionalism from the rest of the natural world. These underlying beliefs are shared by elite opinion-makers and much of the public, and came together during the period of study with the peaking of a particular form of free-market capitalism and its related economic assumptions. During the 1990s, these values and ideology influenced the political and media responses to the scientific messages, and came to define acceptable communication directed at general public, in line with the definition of hegemony.

GUIDING "NO LIMITS" BELIEF STRUCTURES IDENTIFIED BY THIS STUDY

Progress, Exceptionalism and Techno Fix

Before exploring the transparently dominant ideological influence and belief structure of the period—economic rationalism—it is useful to look at strong cultural values that provide underlying context to framing and communication.

Dryzek (1997) offered a historical overview and discourse analysis of two converging belief systems that have informed the political arena during the study period and, more generally, Western beliefs about humans and nature. What he calls a Promethean "no limits" discourse of industrialism informs the belief systems that incorporate "developmentalism" and techno-fix beliefs in Australia.[34] In his discourse analysis of the Promethean world construct, he concludes that at the ontological level Prometheans believe resources, ecosystems, and nature itself do not exist—at least as nothing more than a store of matter and energy "awaiting human manipulation and transformation" (Dryzek, 1997, p. 49). He writes: "The most important natural relationship taken for granted by Promethean discourse is therefore a hierarchy in which humans (and in particular human minds) dominate everything else" (Dryzek, 1997, p. 50).

This is the hallmark of the secular techno-fix world view that has predominated since World War II. While not necessarily denying that natural systems exist in their own right, proponents of this view often subscribe to a "wise use" philosophy allied with developmentalism to argue that not to exploit the planet is "wasteful" and that adverse environmental effects are overstated by special interests such as "greenies", who do not have jobs and the national interest at heart (Beder, 2000, Dryzek, 1997 and other authors). The corollary idea is that humans will always find a technological solution to any environmental problem and that "no-limits" development is the natural order of human endeavour. In the words of Mercer:

> Traditional adherents to this philosophy have been the big mining and timber production companies, farmer and pastoralist organisations, professional engineering bodies and the like (supported by development-oriented State and Commonwealth governments) … and rhetorical links with "progress", "national interest", "wealth/job creation", "development", "growth", "defence" and so on have frequently been made. (Mercer, 1991, p. 41)

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[34] In Greek mythology Prometheus stole fire from Zeus thereby greatly increasing human capacity to manipulate the world to suit humans. The term 'cornucopian' is used by some human geographers and others to denote a similar "no limits" discourse of endless resources and unlimited capacity of the natural world to absorb human activities and pollutants.

Mercer wrote this from a historical perspective in 1991, at a time when the evidence shows that in response to greenhouse risks outlined by scientists, countervailing ethical values based on the public interest and global responsibility had prevailed in Commonwealth and most state policies, and were being communicated to the public. Between 1987 and 1991, response to climate change, rhetorically and at the planning stage, was in fact moving outside the dominant "no-limits" ideology that Mercer describes—but stayed *within* the dominant paradigm of ecological modernisation regardless of new proposals for economic directions to mitigate Australia's carbon emissions (Bulkeley, 2000a). As Bulkeley noted, it did not take long for the "no-limits" world view to reassert itself in its previous form, eventually to dominate the agenda along with economic rationalism, as we shall see. [35]

Pearse (2009) in his ongoing analysis of the "quarry vision" guiding Australian public policy, further unpacks the Australian "no limits" discourse. He argues that regardless of the nominal differences between the major political parties, Australian values have been shaped across the board by a history of, and dedication to, mining the mineral wealth of the country. This belief that Australia's economic and cultural destiny is to be a (well-paid) quarry to the rest of the world has led to a highly conflicted "no limits" and techno-fix discourse in regard to climate change response—full-steam ahead with coal export and domestic use in the face of rising greenhouse gas emissions directly attributed to coal burning, and official rhetoric and framing on bringing emissions down.

Apart from nuclear power at some future date, a government-favoured Australian techno-fix solution to this internal conflict has been the theoretical merits of "clean coal" or carbon capture and storage (CCS) in the coal-burning cycle. As Pearse notes, there is little scientific evidence that CCS will do what it is supposed to do. But the communication frames flowing from government policy would have us believe otherwise.

> Between the coal companies and the governments, hardly a month passes without the industry or its proxies proclaiming another "clean-coal" milestone … based on my rough calculations, a new CCS media release is issued for about

[35] Ecological modernisation is a sociological term borrowed for this thesis as a theoretical framework in chapter 5. It describes the belief that environmental damage can be fixed without changing existing social and economic systems.

> every 100 tonnes of CO2 actually captured and stored. The spectacular growth industry is not clean coal, but clean coal PR. (Pearse, 2009, p. 79)

Because it is not an existing technology, the focus on clean coal is a matter of values and belief, and not evidence-based. Atmospheric and earth scientists offer no techno-fix in any timeframe that matters to current emission statistics. The IPCC does not expect any technological contribution until the second half of this century (Pearse, 2009, p. 81). Pearse also quotes a representative of the National (electricity) Generators Forum saying there is no solution in sight (Pearse, 2009, p. 82). This has not stopped Australian politicians and their economic advisers from framing the public narrative/discourse around the belief that it is possible to continue with the status quo energy mix and clean it up.

More generally in regard to beliefs in technology and economic systems and the potentially moderating influence of scientific evidence, one informant to this study who was a federal and state policy adviser during the 1990s said: "The biggest barrier (to effective greenhouse action) is the intellectual mindset of economists and their belief systems about whether government should be a player in changing the economy" (F. Muller, thesis interview, May, 2006). He called those who advised government based on these beliefs "econocrats". Comparing his experience in Washington D.C. during the Clinton administration, (Muller) said:

> In Canberra we have not had the countervailing science influence to the econocrats. There are not people presenting the story to the decision-makers that "we can do something" about (climate change) right now. So the denial in government policy circles is real … their experts are telling them they don't have to deal with it right now. (thesis interview, May, 2006)

Muller was asked why he thought the NSW and federal governments for whom he worked in the 1990s did not apply a range of existing technologies and efficiency measures recommended in early 1990s government documents (ANZECC, 1990; and other Commonwealth documents). He and other interview informants have said that in "econocrat" thinking, based on neo-classical economics, all efficiencies are already in the system. Therefore promoting energy efficiency measures, for example, constitutes unwarranted interference in the market of the day. Technology academic Alan Pears,

who worked in the arena of energy conservation and efficiency in Victoria throughout the study period, said that in 1994 the federal Treasury Department released a document bowing to a "perfect market structure" and a focus on unfettered competition (A. Pears, thesis interview, November, 2006).

Additionally, there is the predilection for "big hairy audacious projects". While sustainability may be a myriad of small solutions, these may not be considered technologically "sexy". Muller noted that big projects equal jobs and big headlines in the view of politicians. He described the office of former NSW energy minister Michael Costa as accessorised with large images of coal-fired power plants. Similar observations have been made by some environmental journalists interacting with politicians.

Some analysts add that the environmental movement itself subscribes to the techno-fix worldview, bolstering public disengagement from the policy process and making denial of science messages easier to justify with beliefs that all will eventually be fixed.
In a seminal paper, Shellenberger and Nordhaus (2005) reported on their interviews with some 25 of the top leaders of US environmental organisations. While Australian environmental organisations no doubt exhibit regional differences, the global reach of ideas and strategies—along with the similarity of outcomes—allows one to argue that at least some of the same trends are influential in Australia. Noting the lack of a biological systems approach to much environmental policy, they wrote:

> Thinking of the environment as a "thing" has had enormous implications for how environmentalists conduct their politics … (which) hasn't changed in 40 years. First, define a problem (e.g. global warming) as environmental. Second craft a technical remedy (e.g., cap and trade [in Australia, emissions trading]). Third, sell the technical proposal … through a variety of tactics such as lobbying, third party allies, research reports, advertising and public relations. (Shellenberger & Nordhaus, 2005, p. 4)

Even a reliance on individual choice for fluourescent lightbulbs or hybrid cars reflects this same techno-fix mindset, say these authors. They conclude that to the extent environmental organisations prioritise techno-fix ideas, they are subscribing to a version of the information deficit model—if only we have enough technical solutions understood by the public, this problem will be solved.

These authors also suggested internal reasons why environmentalist organisations could be marginalised as they were in Australia in the 1990s. The reasons are: very narrow tactical focus and lack of effective coalitions with other societal interests (e.g., labour unions, or animal welfare organisations, or church groups). This internal "group think" encourages the broader society to consider the environment to be a separate "thing" from mainstream concerns. It also bolsters those who are inclined to think that humans are separate from and superior to the natural world (Shellenberger & Nordhaus, 2005, p. 5). That such thinking is prevalent brings us to the second major sector of "no limits" beliefs: belief in human exceptionalism.

Beliefs in Human Exceptionalism

A cultural mythology that humans are exceptional and not subject to the "laws of nature" underlies much of Western thinking and stems from Christian teachings (Wilson, 2005). This is related to the always forward-looking, linear mythology of "progress" and human betterment. Historical philosopher Ronald Wright wrote about belief in "progress" as cultural myth: "Myth is an arrangement of the past, whether real or imagined, in patterns that reinforce a culture's deepest values and aspirations … Myths are so fraught with meaning that we live and die by them" (Wright, 2004, p. 4).

Historian Lynn White Jr, in his seminal work "The Historical Roots of Our Ecologic Crisis," published in *Science* in 1967, argues that the fundamental religious myth of humans as exceptional is both most pervasive and most internalised in Western culture. "What people do about their ecology depends on what they think about themselves in relation to the things around them. Human ecology is deeply conditioned by beliefs about our nature and destiny—that is, by religion" (White, 1967, p. 51).

White asserts that in its Western form[36], Christianity is the most anthropocentric religion the world has seen. It has a world view that denies the existence of any spiritual qualities (the soul and similar concepts) in other species. From there extends an assumed exceptionalism to the laws and needs of the natural world that brings many people into conflict with environmental science or ecological knowledge. "Christianity

[36] The difference with Eastern Orthodox Christianity according to White is that the Greek Orthodox variant is contemplative and intellectual, whilst the Western variant of Christianity became action-focused, expressed by mastery over nature through science and technology.

… not only established a dualism of man and nature, but also insisted that it is God's will that man exploit nature for his proper ends" (White, 1967, p. 52).

Some scholars have taken issue with aspects of White's conclusions in the intervening years, particularly his reading of the biblical injunction that Man has "dominion" over nature. [37] However, it is well documented that religious beliefs are deeply embedded in Western culture. Modern-day agnostics and atheists may forget that Western science and technology, born from the desire to understand God's works, coalesced with the Industrial Revolution in the 19th century to exploit natural resources—believed to have been put there by God for Man's benefit. Science historian Spencer Weart, in his detailed account of the discovery of global warming (Weart, 2003) underscores the theme that beliefs, including religious beliefs, will guide future climate change because they guide how we deal with our environment in this anthropogenic age where humans themselves can alter planetary systems.

White also identifies the "progress myth", saying our Western (Judeo-Christian) cultural activities are dominated by an implicit faith in perpetual progress, which was unknown either to Greco-Roman antiquity or to the Orient. In fact, Marxism, which is superficially anti-religious, is provocatively called a Judeo-Christian heresy in this analysis, due to its beliefs, along with capitalism, in the guiding myth of perpetual progress. Forty years ago, when environmental studies were starting in earnest, White predicted that ecological crises will worsen as long as people, including many scientists, retain these unexamined basic assumptions and "myths".

E.O. Wilson, Harvard ecologist and a leading theorist on the interaction of humans with the natural world, observes that human beliefs about our prospects on the planet fall basically into two categories: "human exceptionalism" and "environmentalism". He defines environmentalism in this context as an ideology that sees humans as a biological species tightly dependent on the natural world. Human exceptionalism, on the other hand, is the view that transcendent intelligence and technological prowess has freed

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[37] Scholarly argument continues on the reading of Genesis regarding whether God was advising domination rather than "stewardship" over the earth. Recent evangelical movements, particularly in the US, towards "green Christianity", take the alternative stewardship analysis as a guiding principle.

humans from the iron laws of ecology that bind all other species.[38] Humans' conflicted views on their own skyrocketing population numbers is a related example of this thinking.

These beliefs are not always under the surface. They can be framed in aggressive fashion by media commentators. For example, a 2004 opinion piece by syndicated columnist Angela Shanahan, who has taken stances that imply she is a practising Christian, slammed those citizens who would protect Australian wildlife against state government activities as "extreme greenies", with "unreal", "Mickey Mouse", "anthropomorphic" world views that deny there is "such a thing as a hierarchy of living things" (Shanahan, 2004).

It can be argued that there is an intellectual kinship between Christian beliefs in the exceptional role of humans on the planet and the more secular progress, "no limits","cornucopian" views of human activity and impact. Armed with these various beliefs in the "no limits" world view, it may seem rational to dismiss a precautionary approach to scientific risk assessment of climate change—and the population growth that implicitly drives more greenhouse gas emissions. Leading agenda-setters in politics, the media, and business can appear to believe (demonstrated by their rhetorical narratives and actions) that what is happening to the natural world will not affect human culture.

Individually or together, these belief systems, expressed as frames and public discourses, can and did fuel denial and frequent non evidence-based debate, from the early 1990s on, when faced with environmental or ecological science and specifically climate change. Overt expression can be found on the websites of organisations like the Lavoisier Group formed in 2000 specifically to dispute anthropogenic climate change evidence, the environmental arm of the Institute for Public Affairs (IPA), and other free-market Australian think tanks. In a revealing 2004 article on the activities of the Lavoisier Group, *The Age* journalist Melissa Fyfe characterised those who attended a meeting of 50 men (only one woman) in Melbourne as follows: "Some of them were

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[38] Wilson noted that the short-termism that marks not only politicians—but also the species in general when faced with anything other than self, family, or tribe—may have had an evolutionary advantage over the two million years the species evolved, where life was mostly precarious, short and unpredictable. Evolutionary biologists have noted that modern humans bring a palaeolithic hardwire to runaway technical success.

scientists. But many were engineers and retired captains of industry. Presiding was Hugh Morgan, President of the Business Council of Australia and former Western Mining boss. The master of ceremonies was retired Labor politician Peter Walsh," (Fyfe, 2004, p. 1). To the extent that "no limits" belief structures inform these institutions and professions, their opposition to accepting climate change science appears more understandable.

Ecological Limits: Valid Belief in the Late 1980s

Dryzek outlines the opposing discourse—what he calls "survivalism" (Wilson's environmentalism), which is a belief in ecological limits and limits to the carrying capacity of the planet, and indeed the realisation and scientific evidence that humans are one among many evolved species and not so exceptional in many ways. This understanding was popularised by the Club of Rome reports in the 1970s and the works of biologists Paul and Anne Ehrlich, Lester Brown of the World Watch Institute, and many biological and other scientists in the past 30–40 years. This discourse of limits arguably still informed the framing of the public discussion in the late 1980s when my exploration begins. As reviewed in chapter 4, environment and sustainability policy positions had an equal place at government policy tables at that time.

However, the late 1980s was also a time for multinational energy-intensive industries, such as aluminium, to be encouraged in Australia, along with multinational and domestic mining companies, which have since become the mainstay of Australia's coal-dominated energy sector (Pearse, 2007; F. Muller, thesis interview, 2006). Along with these shifts in the economy, the long-term "no limits" value/belief structures of industrialisation reclaimed the public stage in the 1990s. This was reflected in the communication, and in the more traditional, familiar standoff in Australia between environment and economy (Bulkeley, 2001). So we come to the major and defining belief structure that took the reins in the 1990s—economic rationalist ideology.

RISE OF THE ECONOMISTS AND FALL OF "THE PUBLIC INTEREST"

> *The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be*

> *quite exempt from any intellectual influence, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. I am sure that the power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas*
>
> Keynes, 1936, cited in Mercer 1991, preface.

The economic, free-market ideology that was dominant during the study period was a revision of neo-classical liberal economic ideas or "economic rationalism" as it was called in Australia—a set of economic assumptions, beliefs, and values that was gathering steam in the 1980s, and came to govern Australian political economy and public policy increasingly thereafter (Pusey, 1991) . Eventually, these assumptions and values came to dominate all aspects of public discourse (an example of hegemony in action). Conversely, this study suggests that when the climate change message was first accepted by Australian politicians, media and public in the late 1980s, economic rationalism was not yet hegemonic, and some different cultural and ethical beliefs including responsibility as a global citizen were accepted as "normal".

Thus, McDonald (2005) and Bulkeley (2001) have shown that in the late 1980s, concepts of community and a cohesive public interest were still integral parts of the dominant narrative regarding environmental response, specifically to climate change. However, this was changing by the early 1990s. The evidence reflected in the documentary record indicates that these values shifted from an "ethical" world view regarding climate change risk assessment (stressing the public interest, intergenerational equity, inter-country responsibilities, etc.), to a worldview promoting economic self-interest as the dominant value.

Further evidence that the previous moral values had been dropped in the 1990s came in November, 2006. It was a world-first event when 16 Australian religious denominations, spanning all faiths, issued a joint statement regarding the need to value the planet and life. Concern about climate change was described as a core matter of faith and morality for these Christians and adherents of other religions, saying that politicians will be held accountable to "do something" about addressing climate change. "It's not just about the price of coal, or about whether we can't do anything … it's absolutely important that such a large issue … is reflected in our own moral beliefs, whatever faith

they are, when you're confronted by the nature of this kind of challenge" (Crittenden, 2006).

Pusey, in his oft-quoted 1991 research on the Canberra policy-making bureaucracy, notes that in the 1960s and 1970s the general political discourse was communicated in the ordinary consensual language of civil society or the civil sphere (rather than top-down and ideologically framed). He illustrates the discourse change that occurred by the early 1990s, reproduced as illustration in figure 9. This conclusion about a one way shift towards ideological discourse framing may be debatable (for example, it can be argued there was just a different ideology in play during those years—Keynesian welfare capitalism). It is beyond the scope of this study to compare communication across a 40-year time-span. The relevant point is that the "public interest" in the public sphere was formerly assumed to exist as an entity—as distinct from purely economic interests of individuals or corporations as proposed by economic rationalism—and that in the 1970s policy addressed this broader interest.

Figure 9 Change in discourse language from the 1970s to late 1980s

Fig. 5.1 Changes in the character of political administrative discourse in Australia from Whitlam in the early 1970s to Hawke and the late 1980s.

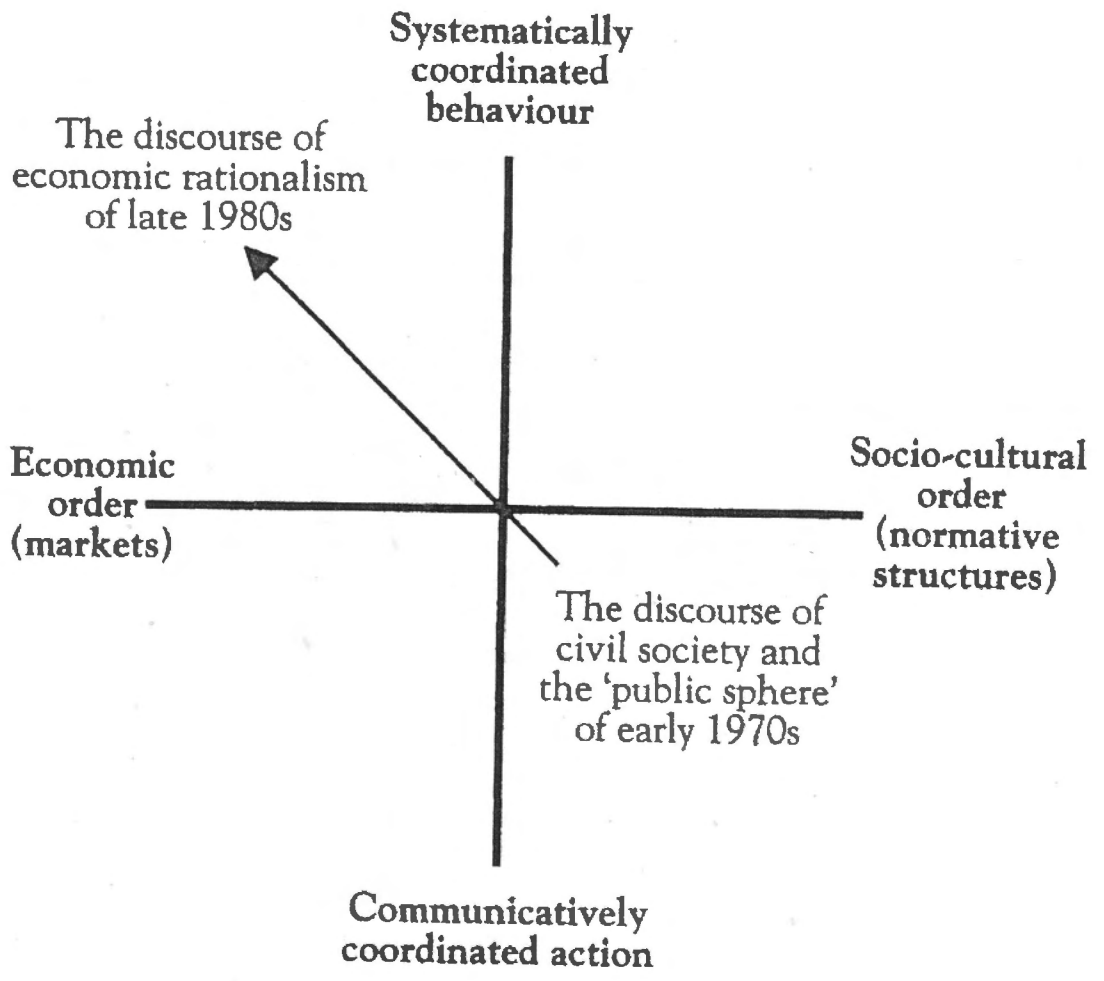

Figure 9. From Pusey, *Economic Rationalism in Canberra*, p.170

In Pusey's view, and that of others, the change in social construction and communication that accelerated through the 1980 and 1990s is intimately connected with the rise of a new generation of economists (some 50,000 graduates between 1947 and 1986) who brought both neo-liberal economic ideology and a narrow technocratic training to the policy arena. This was in comparison to a broadly humanistic training, "liberal" in another sense, common before World War II. Contemporary economic specialisation: "almost invariably excluded any broadening study of philosophy, sociology or the history of ideas" (Pusey, 1991, p. 172).

What is Economic Rationalism?

In this discussion I will use neo-liberalism and economic rationalism interchangeably on the grounds that "neo-liberalism" is the term most often applied in critical discussion (Quiggin, 2005), but economic rationalism is the neologism commonly applied in Australia (Thatcherism, Reaganomics, and the Washington Consensus are other labels for variations on the neo-liberal theme). [39]

This economic worldview assumes that individuals and businesses, given the freedom to choose, will rationally choose to maximise gain and profit, and everything else flows from that. In the discussion about climate change in Australia by the mid-1990s these economic value frames and related rhetoric had arguably succeeded in pushing other values off the stage of acceptable public discourse, i.e., what we talk about publicly, and the language we adopt. The public record I have examined in newspaper articles and government documents indicates that by 1996—and particularly thereafter—the political discourse amplified by the media mostly stopped discussing values that had to do with equity, morality, and the public interest in regard to climate change, as outlined by McDonald (2005), and instead focused on the dollar bottom line. This was framed as concern for jobs, family, and national interest.

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[39] Quiggin himself settles for economic liberalism as the label with least pejorative baggage and also the most descriptive, and points out that proponents of this ideology prefer not to label their policy approach at all but rather to treat it as "common sense". Starting around 1988, "economic rationalism" was the name most often given to Australia's version of economic "neo-classical" thinking (Murray & Pacheco, 2000).

One example of economic rationalist ideology in practice was the shift in public discourse on renewable energy or energy efficiency measures that happened about the mid-1990s—earlier in Victoria with the Kennett "reforms" reflecting think tank neo-liberal blueprints (Cahill & Beder, 2005). With economic rationalist economists installed as expert advisers, the dominant narrative changed to assign unattractive costs to efficiency and renewables (compared to conventional generation of "cheap" electricity) on the theory that the energy market is already at maximum efficiency.

In context, computer models are only as useful as their baseline assumptions. In keeping with relevant theoretical practice, which I step aside briefly to explore in Box 2, economic rationalist models reached their cost assessments while discounting some factors. They did not, for example, factor in the cost to society of government subsidies supporting coal-fired electricity. They also ignored "externalities"—the costs of production that can be shunted outside the corporation or producer, including the cost of environmental consequences such as emission of greenhouse gases. Economic rationalist modelling would also not have given equal weight to any potential *benefits* arising from renewables or efficiency over time (for example, Industry Commission 1991).

Box 2

The Lessons of Economics: What the Universities Have Been Teaching

Universities have been the incubators of changing economic theory, including economic rationalism in Australia, during the past 40 years (Cahill, 2004; Cockett, 1995; Pusey, 1991). As Pusey has argued, the lessons taught as basic economics at these institutions have influenced a generation of bureaucrats, politicians, and policy advisers.[40]

However, relatively little attention has been paid to what is actually taught to impressionable young minds, suggesting that this would be a valuable area for further investigation. Journalist Christopher Hayes spent an academic quarter auditing *Principles of Macroeconomics* at the University of Chicago (Hayes, 2006) and provided

[40] Jones (2002) noted that The Australian National University School of Economics was prominent in producing the home-grown neo-liberal theorists and free-trade economists (e.g., Ross Garnaut who advised Hawke and Keating, and regained prominence since 2007 as the federal Labor government's "climate change adviser" in the words of ABC radio).

a snapshot of what is taught. Efficiency is the defining value of the Chicago School of Economics (home base for the late Milton Friedman version of neo-liberal economics), and is still the basis for instruction. "Too much" government (regulation or public ownership of assets or services) causes inefficient economies in the overall quest for capital growth.

The (international) capital market is seen as the primary regulator of a society. [*Given events of 2008 and 2009 with the crash of this market, courses may change.*]

The conversion of natural and human resources into capital growth will *a priori* raise everyone's standard of living, domestically and globally, without government intervention. With "no limits" and "endless growth" forming an embedded part of this thinking, questions of sustainability have not applied.

The injunction to specialise and trade harks back to Scottish political economist and philosopher Adam Smith's 18th century insights about "comparative advantage" and what creates the "wealth of nations". Former Australian Prime Minister John Howard regularly invoked "our comparative advantage" of exporting fossil fuels, when defending Australia's minimal actions domestically or refusal to sign the Kyoto Protocol on climate change.

Normative models are transformed into "reality". Arguments about the way the world *should be* are converted into assertions about how the world actually is, without the need for empirical data or evidence (in "econ speak", converting normative arguments to positive statements). Thus, "people cannot disagree with neo-classical economics, they can only fail to understand it" (Hayes, 2006, p. 28). This field of economics presents itself as a value-neutral description of how the world is: therefore students do not perceive they are learning an ideology. (In a similar fashion, Keynesian regulated capitalism enjoyed a consensus of "this is the way the world is" before and after World War II—until the early 1970s.)

Theory is demonstrated through economic modelling—simple supply and demand at the level of tertiary education—and is taught regardless of real-world empirical studies that indicate the facts can be otherwise, for example on employment figures (Hayes, 2006, p. 29). Hayes (2006) also witnessed the use of contrarian, sceptical positioning as a

rhetorical tactic to skewer opposing points of view, institutions or consensus. Again, this is noteworthy in the context of the successful deployment of contrarian rhetoric in the public discourse on climate change (p. 30).

The Defining Characteristics of Present-Day Economics

At The Australian National University Centre for Resource and Environmental Studies, economist Jack Pezzey told students at a 2006 seminar that "economics is a mind-set" and that several relevant defining characteristics of the discipline of economics as we now accept it are, [emphasis mine]:

- anthropocentricity—there is no value unless it is related to human notions of value; thus environment is seen as an "amenity" or "input"
- consumer sovereignty—the neo-liberal view that economics *reflects* people's preferences, rather than shaping them (even though people's preferences are always shaped by the culture around them). [This relates to a number of other hallmarks of economic rationalist economics such as the anti-regulatory stance, the focus on the individual and voluntary action and the tenets of public choice theory] [41]
- non-satiation—the notion that people or firms always prefer more "well being" (translated as profit), rather than less
- aggregation—the focus on average or total variables, not their distribution, which is the province of politics
- finite trade-offs—nothing is beyond price
- dynamic analysis—includes "discounting", which means that future costs and benefits are always worth less than today's. Thus, economically, climate change happening in 30, 50, or 100 years time is uninteresting.

Why Economic Rationalists Always Talk About Costs

[41] Public Choice Theory. Consumer sovereignty as an economic concept appears to overlap with the theoretical assumptions of public choice theory (Buchanan & Tullock, 1962) about the rational and self-serving nature of human behaviour in a political setting. Public choice theory can be invoked by neo-liberal thinkers to explain that individualism and self-interest are the natural order.

The benchmark of this neo-classical economics is the marginal cost of supply—thereby the framework or mandate for "no regrets" solutions to climate change, meaning there should be no increased cost to the economy. There are other possible economic frameworks including environmental, natural resource, and ecological economic analyses practised academically.

Ecological economics rejects many of the key concepts of neo-classical economics and its "no-limits" assumptions, and can pose deeper philosophical challenges e.g., to the anthropocentric value system (Pezzey, 2006) and may be therefore a useful tool for climate change cost-benefit analysis.

A "Myth to Live By"

Evan Jones, in his critique of "idealist economics", asserts that the Australian university syllabus shifted to predominantly neo-liberal content while the number of trained economists grew following World War II (Jones, 2002). However, he contends that training is not the end of the story. The context he sees as important for the ascendancy of neo-liberal/economic rationalist theory in Australia was the concentration of these theorists on tariffs and rural industries, and government support.

The enthusiasm for "free trade" and "free markets", and the underlying normative assumptions of neo-classical economics, was also not party political in its adoption but was accepted as early as the 1970s in Gough Whitlam's Labor Party and was reconciled more or less by successive governments with support for unions, environmental regulation, and other forms of social good up until the 1990s. Jones characterises the evolution in Australia of economic rationalism into the dominant economic theory as opportunistic and neither coherent nor logical but rather as a convenient "myth to live by" driven by belief rather than evidence. He suggests "the universalism of the solutions is a clear indication of their religious character: ideology has rushed in to fill the vacuum left by the poverty of analysis" (Jones, 2002, p. 57).

POLITICS AS BATTLE OF IDEAS

> *In the end, politics is a battle of ideas and a battle of commitment.*
> John Howard, 2002 (Johnson, 2002, p. 3)

In the context of this thesis topic, economic rationalism finds its historical place within a "battle of ideas" that has been waged since the environmental victories of social movements in the late 1960s and 1970s. Parts of the ideological underpinnings stem from 19th and 20th century "wise use" philosophy—akin to the technocratic, "no limits" worldview presented by thinkers like Julian Simon and Bjorn Lomborg (in Dryzek and Schlosberg Eds.,2005). "Wise use" and its variants developed in "pioneer" countries like the US and Australia with strong antipathy among some influential elites towards government regulation on behalf of the natural environment (Ehrlich & Ehrlich 1998). In Australia, "wise use" arguments, often couched as "sensible balance", are evident in the environmental writings and speeches from think tanks advocating free markets, individual liberty and as little government as possible, led by the Institute of Public Affairs (IPA), the Centre for Independent Studies (CIS) and others (Cahill, 2004; Murray and Pacheco 2000). Beder (2000) provides a good account of the wise use ideology, its close links with commerce and resource enterprises, and its dissemination by think tanks. She writes "wise use" exhibits:

> … values associated with John Locke … in this tradition the government is best which governs least. (Rights) include the individual's right to appropriate wealth from nature. If no-one has claimed it, it's yours. In this view, the government's role is to help convert natural resources into private property, and then to protect that property (Roush 1995, p. 2, cited in Beder, 2000, p. 48). These beliefs blend well with libertarian philosophies and those of other free market proponents, including corporate executives. (Beder, 2000, p. 50)

This philosophy is often expressed as anti-environmentalism. Wise-use ideas combine laissez faire capitalism with an individualistic, idealised pioneering culture (Prime Minister John Howard's Akubra hat was thus symbolic). These ideas include dedication to unregulated markets, notions of wastefulness if natural resources are not exploited, and the idea that nature is ever-replenishing. Wise-use also links to religious thinking of human domination over nature as outlined earlier. Such ideas gained renewed influence as they were expressed by Australian free-market think tanks and its spokespersons, by media columnists, (particularly in the Murdoch/News Limited press), and by some individuals appointed to the board of the influential Australian national broadcasting service in the later 1990s (Beder, 1999).

Rhetoric Honed By Think Tanks

With "wise use" thinking in regard to the natural environment as one philosophical cornerstone, came the advent of Reaganomics or supply-side economics in the US, Thatcherism in the UK, and "economic rationalism" in Australia. This chapter analyses the Australian case within the global context of ideas imported from European and US thinkers. Deregulation and competition are core values of economic rationalism (Pusey, 1991), and it led to privatisation of public assets, including electricity generators, as well as an all-out commitment to "free trade" by both major Australian political parties (*Labor in Power*, 2010; Sturgess and Torrens, 2009).

The rhetorical ammunition came from right-wing or pro-market think tanks, which have enjoyed a revival in some Western English-speaking countries in the past 30 year—specifically in the US, UK, Canada and Australia (Beder 1999; Cahill & Beder, 2005; Cahill, 2004; Cockett, 1995; Murray & Pacheco, 1999;).[42] Cahill analysed how radical neo-liberal ideas took hold in Australia during the 1990s. Changing the frame of the dominant narrative was the pathway to success. "Like other movements, the main impact of the radical neo-liberals was not direct policy influence but broader discursive shifts … demonising and disorganising opponents of neo-liberalism" (Cahill, 2004, p. 24).

Shedding the Public Interest

In this way, incrementally during the 1990s, this ideology was on its way to hegemony, cemented by a kinship of similar thinking that came to dominate the federal bureaucracy and politicians and influential elements of the media (Hamilton 2001; Manne, 2005; Pearse 2007; Pusey 1991). Pusey, for example, found that since the early 1980s and

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[42] Cahill (2004), following the seminal work of Cockett in the mid-1990s, documents how overseas think tanks influenced radical neo-liberal thinking in Australia and the establishment of Australian think tanks. "Radical neo-liberal organisations such as America's Heritage Foundation, Britain's Institute for Economic Affairs (IEA) and international networks such as the Mont Pelerin Society and the Atlas Foundation served as examples for the Australian movement to emulate." Tactical advice, high-profile speakers and organisational liaison between countries was common. "Because of this, the ideas of Friedrich Hayek, Public Choice Theory, Milton Friedman and developments in neo-liberal theory and neo-liberal policy alternatives have been disseminated in Australia" (Cahill, 2004, pp. 8–9).

starting with Labor under the Hawke government, a dominant pattern evolved in which "Ministers and their top SES staff see the world very much as male age-mates through a shared and restricted formative training in economics" (Pusey, 1991, p. 8). The effect, as Pusey was noting in the early 1990s, has been a departure from earlier traditions of the Australian public service, and this was extended to the administration of such scientific organisations as the CSIRO as it was corporatised and directed to serve industry (thesis interviews, 2006). Over time there was less frank and fearless debate coming from the bureaucracy regarding the pros and cons of the economic rationalist worldview, which increasingly saw the public interest as indistinguishable from that of large extractive industries (Hamilton 2001).

Hamilton reports that in the 1990s, the neo-liberal economic and social values were often driven by bureaucrats who, for example, would downplay the benefits of energy efficiency strategies—both economically and environmentally—in policy discussions. Because the view was that markets are by definition ultimately efficient, mandating efficient commercial or industrial facilities of household appliances must add costs and "intervene" in markets unnecessarily. The net effect—as Hamilton describes about the final ESD working groups on energy supply and energy use under Keating in the early 1990s— was "a situation of 'industry capture' that has made progress on greenhouse policy extremely difficult" (Hamilton, 2001, p. 33).

Examining the dominant political paradigm in Australia (even before this arguably comprehensive industry dominance that came to guide greenhouse policy in the 1990s), human geographer David Mercer describes an axis that joins the state apparatus to the corporate economy: "With the state usually sharing the private enterprise ideology and generally perceiving its primary role as facilitating and promoting private commercial investment" (Mercer, 1991, p. 47). Pusey wrote that this shared worldview has been mediated into federal and state governments, and amplified by:

> Australia's foreign-owned media, the New Right "think tanks" and research centres that have had an enormous success in penetrating the Canberra apparatus, and thirdly, international economic organisations such as the World Bank and the OECD. There is also need to contend with the diminishing intelligence that is available from an increasingly "rationalised" Australian university system and, more fundamentally still, in the limitations that are

> inherent in what Manning Clark, Donald Horne and Hugh Stretton see, in the words of the latter, as "the poor quality of leading Australians".
> (Pusey, 1991, p. 13)

The capture of the bureaucracy and policy advisers was further documented by Pearse (2005, 2007) in regard to climate change policy. During the 1990s there has been a significant revolving door between industry lobbyists for (often transnational) corporations extracting Australia's mineral, soil, and water resources; the federal bureaucracy; and ministerial advisers. The agenda-setters thus shared an economic and cultural ideology, which allowed them to work together inside or outside government.

In recent decades the agenda returned the country's destiny to exploiting natural resources. Political rhetoric initiated by economists (Jones, 2002), framed this as the country's "natural competitive advantage," a phrase that is a core tenet of classic free-market economics. In this view, there is internal logic to applaud Australia's role as an exporter of fossil fuels (particularly coal, but also natural gas and oil, and now also uranium), sell soil and water through exporting 80% of agricultural production, and in the same vein exploit other natural elements such as old forests sold as woodchips or wildlife exported as kangaroo meat. Another "competitive advantage" was to lure to Australia energy-intensive multinational industries, such as aluminium, with the offer of "cheap" coal-fired electricity.

Under those circumstances, scientific risk communication about the need to lower greenhouse gas emissions from fossil fuel and other resource industries, along with proposals to lower demand, threatened an economic blueprint that in greenhouse risk analyses is called "business as usual" or retaining "the status quo". The messages of risk and the proposals for a different energy economy had to be contained and neutralised (Pearse, 2005, 2007; G. Pearse, personal communication, 2006).

Anglo/US Ideas on Regulation and the Public Sector

The English free-market tradition and its late 20th century effect on the political economy of Australia is addressed by Pusey who wrote:

> Australia was…for much of the first half of this [20th] century the model social democracy….[now], as Canberra is swept by a locust strike of economic rationalism, the fate of this social experiment would seem to be in the unfriendly grip of ideas that come instead from Britain and the United States (Pusey 1991. p.2)

English historian Richard Cockett has traced the current thinking of neo-classical liberalism and free enterprise to the so-called Austrian School at the London School of Economics. Led by Friedrich Von Hayek, Karl Popper, and Lionel Robbins this school began criticising the then prevalent Keynesian economics starting in the 1940s. Milton Friedman and his colleagues of the so-called Chicago School at the University of Chicago were influenced by the English economists and proposed similar radical remedies starting in the 1950s—to end regulation of the economy and to minimise the state/public sector (Klein, 2008).

Friedman was later to have direct influence in Australia through his thoughts on globalisation and capital markets, taken up by both major Australian political parties, and as a speaker invited by think tanks (Klein, 2008). These theories and thinkers started their global influence with biannual international meetings at Mt Pelerin in Switzerland, the origins of the Mount Pelerin Society that provides an international network for these ideas to this day, including in Australia (Murray & Pacheco, 2000).

The 20th century neo-liberal theoreticians trod in the footsteps of a free-enterprise, minimal government and libertarian tradition strongly established in the US, and of 17th and 18th century political economists and liberal thinkers including Locke, Smith, Ricardo, and Malthus. It has been argued that these ideas re-emerge with the needs of capital. The latest incarnation was spurred by a slowdown of economic activity in the 1970s following two decades of prosperity after World War II under different political and economic world views—social democracy and Keynesian welfare capitalism (Cahill, 2004; Chomsky, 1996; Davies, 2004; Murray & Pacheco, 2000).

Keynesian welfare capitalism promoted mass markets, citizens becoming "consumers", and fed expectations of endless "growth" while science and technology boomed (Broomhill, 2001). John Maynard Keynes was the intellectual father of this phase of capitalism, which approved of managing consumer demand (upward and downward)

and industry regulation to benefit employment and social goals. These management mechanisms eventually benefitted environmental protection as well, as the first wave of environmental awareness in the 1970s demonstrated. The period after World War II was also characterised by unprecedented support by governments (both capitalist and communist) for science. Technological advances fuelled both the post-war production and consumption boom, and also set up a belief system in the "techno-fix" for all problems facing society, discussed earlier.

Under Keynesian welfare capitalism a social democratic political approach had manifested in Australia in part as an "'accord" between capital and labour, and a more inclusive approach to decision-making—including scientists and environmental organisations. This was in place as our story starts in the late 1980s. The ecologically sustainable development (ESD) workshops set up by the Hawke Labor government in 1990 were a peak example of this inclusive, mainstream approach, discussed elsewhere in this thesis (Bulkeley, 2000, 2001; *Labor in Power*, 2010; McDonald, 2005).

The economic rationalist ideas that took over were hastened by a recession in Australia by the early 1990s, which is in line with the analysis that these ideas gained ground as a reaction to the slowdown of the post-war boom of expansion and "growth". Along with rejecting efficiency as stifling economic growth, the rationalist ideas included a rejection of any "intervention" (itself a loaded word) in the market by regulating either consumer demand or supply on behalf of lowering emissions (Hamilton, 2000). It also normalised the idea that all action had to be voluntary and by choice, as discussed earlier, thereby also posing a much greater challenge to any and all communication exercises to change behaviour in order to lower emissions.

Rhetorical framing about "freedom", "choice" and "individual liberties" is consistent with the neo-liberal intellectual framework. Public choice theory, for example, postulates that the individual operates optimally as a sole trader in a market society, thereby also downplaying concepts of community (Buchanan & Tullock, 1962). Distaste for regulatory intervention in favour of voluntary action ("choice") and supply-only solutions are hallmarks of what economist Evan Jones has likened to a quasi-religious belief in the powers of the market and unbridled competition (Jones 2002).[43]

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[43] Keynesian theories of "demand management" saw no problem with regulation for the public good (e.g., efficiency measures or energy conservation) while "supply-side" neo-liberal theories eschew

The public's influence on decision-making arguably also declined with the emerging hegemony of economic rationalism. Researchers of this time period have documented the anti-democratic decision-making of the Howard government after 1996 in regard to greenhouse policy, for example, conferring in serious fashion almost exclusively with corporate leaders of the resource extraction and top energy sectors (Hamilton, 2006; Pearse, 2007). Such elite behaviour is consistent with the theory of agenda setting that I discuss in the next chapter on media and political interaction, and is also consistent with a belief in the wisdom of the market and its disciples.

Growth is Good, Growth is Everything

In this ideological environment dominated by "the market", growth remained a central political objective in the US (and arguably in Australia) in a culture that left behind traditional moral, ethical, and communal objectives and restraints in the view of political scientists William Ophuls and Stephen Boyan who noted in an essay on US environmental politics:

> Growth is the secular religion of American society, providing a social goal, a basis for political solidarity and a source of individual motivation. The pursuit of happiness has come to be defined almost exclusively in material terms, and the entire society—individuals, enterprises, the government itself—has an enormous vested interest in the continuation of growth (Ophuls & Boyan, 1998, p.187).

They argued that American politics is a record of a "more or less amicable squabble over the division of spoils of a growing economy" (p. 187). Even a superficial review of 1990s, and more recent, Australian political economics and culture, exposes the same unexamined, cultural mythology of "growth" and material consumption underpinning society's well-being and prosperity.[44] This thinking became the "normal" response to an environmental challenge. For example:

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regulation in favour of voluntary action within a market economy and proffer technological supply-side solutions (clean coal or emissions trading,).

[44] I use the term "myth" or "mythology" following the example of historical philosopher Ronald Wright who, in *A Short History of Progress*, said that the idea of material progress coincides closely with the rise and promise of science and industry, and the decline of traditional values. Growth and progress are related ideas in this arena. "Our practical faith in progress has ramified and hardened into an ideology—a secular religion … Progress therefore has become a "myth" in an anthropological sense. Successful myths

> US President George W Bush and Australian Prime Minister John Howard have concluded their bilateral talks in Hanoi, Vietnam, confirming their stance on climate change … "We don't believe that Kyoto is the answer" [Mr Howard] said. "We can have a debate about the severity of the problem, but there is really no debate about the desirability of responding to it, provided we do it in a way that maintains economic growth in our societies and the world.
> (*Howard Firm on Opposition to Kyoto*, 2005)

Boyden, in his seminal text on human ecology, also notes that the current framing in advanced industrial societies of an unquestioned state of endless economic "growth" can be read as both a social pacifier (justifying inequality because there is always hope for more production and income) and as a defining hallmark of "modern" humanity (Boyden, 1987). If we do not adhere to the growth script we "go back to the Dark Ages", "freeze in the dark", and similar rhetoric.

With an unquestioning belief in growth and progress and markets as saviours and innovators, economic rationalism is thus another arm of the "no limits" belief set that influenced policy and communication during the study period. Events since World War II have justified this scientifically flawed belief in endless growth—we see prosperity increased, populations booming, ever more resource extraction worldwide, and human mortality dropping in Western societies.

Dryzek (1997) in his compendium of environmental politics, agrees that economists have been at the forefront of the second-half of the 20th century "cornucopian" arguments. Arguments are based on the premise that price is a measure of scarcity and then gathered pricing data that showed the real price of natural resources has been falling since the beginning of the 20th century. "And if price measures scarcity this means that natural resources are becoming more abundant with time" goes the argument (Dryzek, 1997, p. 47).

However, since at least the 1970s, there have been countervailing studies and arguments by biologists, social scientists, and some economists who see people as part of finite

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are powerful and often partly true … They are the maps by which cultures navigate through time" (Wright, 2005, p. 4).

nature and subject to gathering environmental costs associated with the boom times. The 1972 Club of Rome study, *Limits to Growth*, applied "systems dynamics" to economic and ecological trends. It assessed trends in resource extraction and measurable effects on underlying biosphere life-support systems, and concluded (generating much controversy at the time) that "the limits to growth … will be reached sometime in the next 100 years. The most probable result will be a sudden and uncontrollable decline in both population and industrial capacity" (Boyden, 1987, p. 217). [45]

Economic Rationalist Beliefs and Greenhouse Policy

Economic rationalist theories built on no-limits assumptions (as are other modern political ideologies of the industrial age) have been critiqued as more comprehensible as a belief system, rather than being based on empirical facts—which is why I include it in this axis of beliefs and values. This approach to theory and practice is one of the disciplinary divides between the field of economics and empirical scientific research in recent decades. A movement of economists and academic critics is questioning the orthodoxies of neo-classical economics on just these grounds. From a bio-historical perspective, such beliefs are naive according to Boyden (1987). Nobel Prize winning economist Joseph Stiglitz has been quoted as calling the dominance of the neoclassical model "a triumph of ideology over science" (Hayes, 2006, p. 27).

University of Sydney economist Evan Jones in his paper on the rise of an "idealist economics" in Australia from the 1950s on, argues that theory divorced itself from any discernible empirical evidence as the "cult of the economist" became dominant in government policy, and expressed itself as a new emphasis on competition both domestically and globally (globalisation).

> The involvement of economists in public policy, as public servants, advisers or proselytisers, necessitates substantial involvement with economic data and institutions. Yet this engagement has been constrained in practice by the *a priori*

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[45] A frequently quoted calculation, attributed to E. O. Wilson, says that at present rates of resource consumption, if everyone consumed resources at the same rate as Australia or the US, we would need four additional similar planets to remain sustainable (e.g., quoted by David Salt (2005) in *Cosmos*, September, p. 61).

> attachment to a pre-conceived conceptual framework … this process has been tangibly reflected in the work of the dominant official research body, IAC [Industries Assistance Commission later Industry Commission, now Productivity Commission]. (Jones, 2002, p. 48)

The Industry Commission and its later incarnation has played pivotal roles in the public discourse on climate change from 1991 on, being asked by federal politicians—starting with then Treasurer Keating—to provide economic modelling on cost to the economy of responding to climate change as outlined in the previous chapter (Industry Commission, 1991). At the same time, economic rationalist "idealist" theories about a competitive economy (Jones, 2002) were adopted by both Labor and Coalition governments during the study period. A raft of "reforms" followed, included the dismantling of regulatory tools such as import tariffs (which eventually doomed many Australian manufacturing industries and jobs) and the selling off of public assets and deregulation of the energy market under competition policy (Broomhill, 2006; Jones 2002).

Jones wrote that The Hilmer Report into National Competition Policy (Independent Committee of Inquiry, 1993) "exudes limited understanding of the workings of competition in practice. The Report's central political intent is to undermine the dominant historical role of publicly-owned authorities in the provision of infrastructure. Both the presumed problems needing correction and the appropriate means of their correction are stated axiomatically without evidence" (Jones, 2002, p. 51). This disciplinary habit of "axiomatic" statement is also called normative analysis i.e., stating what "should be" but not necessarily what the evidence shows.

Jones also noted that competition policy from 1993 on (under Keating) was imposed on the Australian States "in a top-down process" (Jones, 2002, p. 52). National competition policy worked against climate change response through its effect on energy policy, a state responsibility. Deregulated energy utilities moved away from previous commitments to "demand-side solutions" such as energy efficiency and renewable energy programs (documented in ANZECC, 1990, 1991) and moved into a national competitive arena vying for new customers. With time, the whole energy sector became adversarial and conflict-driven, and business leaders as well as political leaders became dedicated to "supply-side" energy management i.e., more energy for more development and growth (A. Pears, thesis interview, November, 2006).

Pears who in the early study period advised the Victorian Government in the energy efficiency arena, says that whether it is commercial buildings, efficient appliances, or transport, Australia during the 1990s and since has experienced an "almost complete policy failure" in regard to curbing greenhouse gas emissions.

> We know how to make cuts in every sector, some demonstrably successful. But there are powerful economic groups and narrow theorists and nervous politicians believing that environmental action will hurt the economy. It's been a brilliant PR strategy, and it's left the community confused and disempowered. These beliefs are based on interpretations of crude economic modelling and reinforced by the preconception that you help either the environment *or* the economy. (A. Pears, thesis interview, November, 2006)

This is despite the fact that the 1992 National Greenhouse Response Strategy (NGRS) committed federal and state governments to a range of greenhouse response measures, particularly in the energy sector which, in the mid-1990s, was estimated to contribute 67% of Australia's greenhouse CO_2 emissions and 53.4% of total greenhouse emissions (Walker, 1996). However, competition policy and deregulation erected financial barriers to the very efficiency measures that were seen as an easy first step. For example, without "intervention" commercial interest rates favoured status quo methods and suppliers of energy (Walker, 1996). Walker also noted that not pricing energy supply "externalities" like environmental pollution "discriminates against energy efficiency and energy sources (such as renewables or gas) which have a lower level of adverse impact on the environment" (Walker, 1996, p. 483).

Broomhill argued in his 2001 study, which looked at the effects of the neoliberal ascendancy on Australian state government policies, that a discourse of inevitability and lack of alternatives to this political ideology had profound effects at the state level, as state energy utilities were privatised and encouraged to compete for more sales on the national scene.[46] Nevertheless, in the context of "growth", "progress" and "no-limits" beliefs, such restructuring in the face of related and rising atmospheric pollution may

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[46] "Worldwide, a powerful coalition of global corporations, right-wing economists, international credit rating agencies and international political institutions was promoting just such competitive neoliberal 'reforms' as the way to a restructured economy and economic regeneration," (Broomhill, 2001, p. 117).

still be seen as consistent. In the event, during the second half of the 1990s, conservation and efficiency finally fell off the policy agenda—in favour of supply-side techno fixes such as carbon capture and storage, and the nuclear option for a time. Pears supports the hypothesis that there was a deliberate political strategy, developed with the resource industries, to discredit the science and scare the electorate with economic modelling, such as ABARE's, on costs (A. Pears, thesis interview, November, 2006).

Other evidence that response strategies had veered away from the agenda set in 1987–1991 was extracted from Bouma, Pearman & Manning (1996). This is a CSIRO update on climate change knowledge eight years after the seminal greenhouse conferences hosted by the research agency in 1987–1988. It contains analyses, like the one quoted above by Walker, on barriers to effective policy response by the mid-1990s. The economic rationalist viewpoint is evident from the economist contribution by ABARE's Fisher et al. in the same volume. On the positive side, the volume still contained six research articles on the potential for energy efficiency measures—all based on talks at CSIRO's Greenhouse '94 conference, along with a further 10 on other response options both national and international.

Deregulating and mandating competition in the energy sector is a prime example of the profound influence of ideology on the climate change story during the study period, with the shift away from a previous state of political/economic consensus on market regulation at some levels in the public interest.

1980S TO EARLY 1990S: NOT YET HEGEMONY OF ECONOMIC IDEAS

There were still differences in the interpretation of neo-liberal prescriptions under different economic advisers to prime ministers in the period under review. These help explain the gradual evolution, or deconstruction, of Commonwealth climate change policy as the 1990s wore on. For example, while economic advisers and members of the federal Labor caucus under Hawke in the mid to late 1980s adopted the economic advice that regulation of capital markets and tariffs inhibited Australia's economic development (Cahill, 2004; Jones 2002), that government nevertheless might have intervened in the market for labour and social goals. As shown by researchers such as Bulkeley (2000) and McDonald (2005) as well as newspaper articles and government

documents gathered for this study (e.g., Seccombe, 1988; Hawke, 1989), regulation for the public good was at least still on the table, for example the 1990 interim emission reduction target for greenhouse gases. As the 1990s progressed and a hegemonic situation solidified, that policy option also dissipated.

Not all researchers agree with the broad tenets of the analysis presented here. Brennan and Pincus (2002) for example, disputed the influence of a new ideology in the driver's seat and the central role of economists in spreading that ideology domestically. They argued that since support for deregulation has been bipartisan in Australia, and in tune with developments elsewhere in the Western world, a move to economic rationalist policies was simply a rational response to external factors.

Ideology of English-Speaking Democracies and Hegemony after 1996

In 1992 journalist Ken Davidson wrote (in an edited book) about the predominance of economic rationalism in the Anglo-Saxon world by the 1980s where:

> anyone who wanted to be a serious player in the socio-economic debate in the English-speaking countries has to pay obeisance to it … Economic rationalism dominates the universities, the central or coordinating bureaucracies, the privately endowed think tanks, the business lobbies, and the media. (Davidson, 1992, p. 58)

There are several insights on offer about the global hegemony of this ideology in English-speaking democracies in the past decades. Jones suggests that the long-standing classic liberal tradition (freedom, individualism) linked to capitalism in English-speaking countries made it easier for all sides to accept this neo-classical economic revival, along with the pioneer or colonial cultures shared by these countries (US, Australia, UK, Canada).

Although this ideology had been accepted early in the timeline of this study by political elites, the evidence suggests that its final ascent to hegemony can be correlated with later political leadership. Prime Minister John Howard and Coalition policies by the mid-1990s exemplified the most undiluted expression of economic rationalism yet seen in Australia (Sturgess and Torrens, 2009). In terms of climate change response, there

was a consensus of ideology amongst politicians, financial supporters of free-market think tanks, and leaders or lobbyists for resource extraction and energy industries in Australia—mining, agriculture, aluminium, electricity generation—i.e., those industries that constitute the backbone of Australia's claimed "competitive advantage" and had the most to lose with changes in the energy economy.

THINK TANKS AND THE "WAR OF IDEAS"

This communication analysis of ideological hegemony and a "war of ideas" would not be complete without a closer look at the role of think tanks (the colloquial name for non-government policy centres funded by corporations, private money, and the taxpayer) which have surpassed earlier more informal networks (the club, the school or university, the corporation) as vehicles for ideological battle. Most relevant to this inquiry, they have adopted the trappings of academic and scientific research—the conference, lecture, and journal routes. Their "thinkers" are able to be far more definite and far less constrained by peer review than most professional or academic scientists or other researchers on issues such as climate change—this also includes the writings of sceptical scientists, published by the think tanks, which are seldom peer reviewed (Beder, 1999; Cahill, 2004, Cahill & Beder, 2005; Hamilton, 1997; Jacques, 2008; Murray & Pacheco, 2000; Pearse, 2007). Carey (1987) comprehensively researched the public relations and agenda-setting role of free-market think tanks with strong US influence in the '70s and '80s.

The Institute of Public Affairs (IPA) is the oldest and probably best known of the Australia free-market, neo-liberal think tanks. Its environmental arm is very active in communication and it has promoted the publications of sceptic scientists like Ian Plimer, Bob Carter, and William Kininmonth during the study period (their position discussed in more detail in chapter 8). The Tasman Institute, established by former Monash University economics lecturer Michael Porter in 1990, like the older IPA, adheres to economic rationalist theories and positions, with direct and indirect relevance to climate change policy development. The Institute's 1995 annual review revealed a "who's who" of Australian resource industries among the 21 corporate members and its flagship project at that time was called "Markets and the Environment". Its focus was issues affecting investment in Australia's resource-based industries (Maddox, 2005).

Tasman and the IPA are among at least five pro-market, neo-liberal think tanks in Australia that have enjoyed increasing political influence in the battle of ideas for controlling the public agenda since the mid-1980s. On climate change, Tasman was amongst the first to criticise Australia's proposed response strategy (*Economics and the Environment* 1990). The others topping the list are the Committee for Economic Development of Australia (CEDA), the Centre for Independent Studies (CIS) and the Australian Business Council (BCA) (Murray & Pacheco, 2000). The influence was overt in the case of the state of Victoria in the early 1990s where a state policy "reform" blueprint was crafted by the Tasman Institute and the Institute of Public Affairs (Cahill & Beder, 2005) and put into effect with the election of the Kennett Government in 1992. It stopped Victoria's well advanced climate change response agenda, amongst other policy changes.

Ideas and writers from these think tanks have taken up frequent residence on the opinion pages of major newspapers, particularly in the News Limited/Murdoch media (McKnight, 2005), as well as on talkback radio and in rural publications (e.g., Jennifer Marohasy as environment director for the IPA wrote a regular column for *The Land*). IPA executive director Mike Nahan wrote a column in the Melbourne *Herald Sun* during at least part of the study period. According to Pearse who looked at the network between the think tanks and the lobbyists and, tangentially, the columnists, said "All the same names keep coming up" (Pearse, 2007, p. 244).

The CIS started in 1976 in the garage of then high school maths teacher Greg Lindsay, who has remained the director as it went from rags to riches, thanks to corporate sponsorship from Western Mining's Hugh Morgan among others (Maddox, 2005). CIS has linked economic rationalism with social conservatism under Christian and family values icons, and researchers have called it a favoured brain trust for not only News Limited's Rupert Murdoch, but also Prime Minister John Howard during his tenure (Maddox, 2005; newspaper reports)—illustrating the linkages of think tank with media and politicians, also documented for the IPA through links with some news editors (McKnight, 2005). John Howard was often quoted as addressing the CIS—for example,

its 30th anniversary celebrations in 2006—and also frequently used the conservative journal *Quadrant*. [47]

During the period of this study the Business Council of Australia's President Hugh Morgan and his associate from the mining industry, Ray Evans, featured prominently in reports on the development of not only the Tasman Institute and CIS, but also other pro-market, socially conservative, Christian values and scientifically contrarian think tanks in Australia (Hamilton, 2006; Maddox, 2005). That list includes the Lavoisier Group, established in 2000 specifically to counteract climate change science with Morgan as the first President and Evans as Secretary (*About the Lavoisier Group,* 2006)). In 2004 Evans told *The Age* reporter Melissa Fyfe that many members of the group of mainly retired engineers and industrialists think climate change is "a scam" (Fyfe, 2004). The group has distributed contrarian/sceptical books, sponsors speakers, and provided material to conservative columnists.

That neo-liberal think tanks intersect with media via columnists is explored in depth by Pearse (2007), referring to columnists like Christopher Pearson, Piers Akerman, Frank Devine, or Miranda Devine in print media. It is an impression, begging further analysis, that these columnists have rarely been named within the context of their organisation and what it stands for (for example, ideologically free-market and anti-public sector, anti-union, anti-environmentalist, or one of a small number of climate change sceptics) unlike, for example, Clive Hamilton, former Executive Director of the Australia Institute who was frequently introduced on the ABC and elsewhere as an environmentalist or from a left-leaning think tank. It may be evidence of the hegemonic nature of the "no-limits" ideologies that people who espouse them become the mainstream.

In the next chapter, I further explore the perspective that this lack of context is due to shared values amongst politicians, the think tanks, columnists, and certain media editors and owners in a concentrated media market and amplified by political reporters. "Today

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[47] In a speech celebrating the 50th anniversary of the conservative journal *Quadrant,* Mr Howard reportedly named Ronald Reagan, Margaret Thatcher, and Pope John Paul II as the "towering figures" of the late 20th century for their moral clarity and ideological opposition to all collectivist thinking as "stultifying orthodoxies and dangerous utopias." In his speech he also addressed the historical battle of ideas for western civilisation and "the essential connection of personal, political and economic freedom." The same report in *The Age* newspaper notes in the context of Mr Howard's speech that *Quadrant* was set up with funding from the CIA—the US Central Intelligence Agency (Schubert, 2006).

this intellectual universe and its aggressive 'war of values' sets an agenda for public debate. They [sic] can do this thanks to the monopolistic newspaper holdings of News Ltd … in terms of circulation it has almost 70 per cent of the capital city and national newspaper market" (McKnight, 2005, pp. 55–56).

International columnists and speakers, like the far-right Canadian Mark Steyn or European statistician Bjorn Lomborg, have been promoted by the think tanks and the columnists. Of interest to communication studies is that the language of some of these columnists can be extreme and aggressive in the demonisation of climate change science and communicators as cultists, nature worshippers, and communist conspirators "hostile to capitalism and the market economy" (Pearse, 2007, pp. 160–161).[48]

Politicians from both major parties, since at least the mid-1980s, have accepted the "expertise" emanating from these think tanks, their economic rationalist ideas and policy prescriptions, with the most prominent public examples seen with the federal Coalition government after 1996.[49]

The Internal Logic of Marginalising the Natural Environment

With an understanding of the neo-liberal ideological worldview, one can better comprehend a response to climate change science during the 1990s that might otherwise be perplexing and might seem irrational in the face of the mounting scientific evidence that society encouraged scientists to gather. The scientific evidence is a "public interest" social construct suited to communal social values and understandings of risk. However, an ideology that society is no more than a collection of self-interested individuals and groups, in a belief-driven, quasi-religious relationship to "the market", is congruent with a rejection of the communal concept of "public interest" both in science and in policy.

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[48] A 2010 study by Hamilton exposed the link between the incivility of these commentators in print and on their blogs with a barrage of hate email directed against scientists and journalists involved with communicating anthropogenic climate change (http://abc.net.au/unleashed/stories/s2826189.htm).

[49] Examples of government acceptance can be seen in the fact that think tank-affiliated or conservative pundits who wrote or write for News Limited publications, such as anthropologist Ron Brunton (IPA Senior Fellow) (McKnight, 2005, p. 63) and journalist Janet Albrechtsen were appointed to the public broadcasting ABC Board by the Howard government.

During the same period of neo-liberal cultural hegemony, there is ample evidence of a shift away from perceiving the natural environment as part of the general "public interest" to being tagged as a "special interest", and environmental scientists and groups along with it. It can be argued that by the mid-1990s, Australian public discourse had moved away from a consensus about the environment built since the 1960s and related to an understanding of "the public interest" and "civil society" i.e., that an unpolluted natural environment, or public health are not "special interests", pushed by self-interested groups in opposition to the mainstream economic interest. However, during the 1990s, successive federal and state governments—influenced by the beliefs of economic rationalism—framed environmentalist issues and their spokespersons—"greenies"—as being counter to the interests of the Australian mainstream (Bulkeley, 2000; interview material).

Reasons advanced for this weakening of the public interest, in addition to ideology, have been the weakening of traditional community avenues for public discourse—the political party, the union, the Church, the community association or, indeed, a more diverse media. Ideologically, "A disinclination to deal with groups has been reinforced in the major parties by the fashionable theology of public choice theory. This has cast interest groups as selfish and self-serving, and has disputed their representational legitimacy" (Marsh, 2005, p. 222). In this environment, the combined agenda-setting capacity of business lobbyists, politicians and the media cemented in place the revived ideas of neo-liberalism with significant effects on climate change response during the mid to late 1990s.

CONCLUSION AND DISCUSSION

In postulating that ideas, values, and beliefs have profound influence on societal responses to environmental questions, this thesis takes the reader down one track of a road exploring *how* and *why* Australia was responding to anthropogenic climate change between the late 1980s and the end of the 1990s. It is argued that long-standing beliefs––held by members of Australian and other Anglo/Western societies—in unlimited growth, technological "fixes" and human exceptionalism were encouraged by science and technology innovations since World War II. These beliefs and assumptions intersected during the 1990s with the evolution to hegemonic proportions of neo-liberal, or economic rationalist, economic beliefs. Together these beliefs and values supplied an

internal logic for a dominant narrative of denial and procrastination in response to the science risk messages on climate change and its causes in emissions from burning fossil fuels and other human activities.

In the early study period these values and beliefs were leavened with other values like ethical global and intergenerational obligations to address climate change. Changes in political leadership changed the dominant value hierarchy, dropping the ethical and obligation values off the list. The overriding influence on Australia government policy of similarly-trained economists, post-war, has been credited by some researchers as a basis for the wholesale adoption of economic rationalist thinking—a discipline based on normative ("what should be") assumptions about markets. Economic rationalism therefore can be characterised as a belief construct rather than being evidence-based. I have agreed with the analysis of influence based on the evidence that Treasury and other economists reframed climate change policy towards a purely market and trade focus. Related ideological policies in the 1990s to deregulate and push previously publicly-managed state energy companies into growth and national competition—rather than towards demand management and efficiency —had a direct influence on Australia's response to climate change in the 1990s.

The evidence and analysis presented in this chapter suggests that Gramsci's theory of cultural hegemony fits well the situation that developed within Australia during the 1990s i.e., that neo-liberal/economic rationalist ideology advanced by an elite—economists and like-minded corporate leaders, bureaucrats, politicians, and media managers—came in the 1990s to dominate everyday ideas and practices through communication and institutional "reform". I have shown how that hegemony evolved as a battle of ideas and values, and the influence of free-market think tanks in providing intellectual ammunition for the public discourse.

Discussion: How we Generate "The Tragedy of the Commons"

Many observers have pointed out that an ever-growing human population lies at the root of environmental dilemmas, including anthropogenic climate change. As populations grow, a belief in economic "growth" has traditionally been the bedrock of prosperity and social stability. The need to instead transform economies—and return natural resource use and population dynamics to a "steady state"—is addressed by various

authors including University of Canberra Professor of Public Policy Jenny Stewart who wrote: "We're deluding ourselves if we believe we can simultaneously have both economic growth and environmental stability" (Stewart, 2007, p. 17).

Political scientists Ophuls and Boyan Jr (1998) argued that the basis of modern society and politics is the assumption of "no limits" so that an endless pie of benefits can continue to be divided up amongst ever more people. Moreover, they say, society is structured to give economic special interests the most power; short-term political strategies have proven successful "giving everyone what they want" at minimal cost; and the consequences of ecological disruption are not entered into the equation. While these authors have studied the US political system and assumptions of democracy, much of what they have to say has echoes in Australia.

Furthermore, say Ophuls and Boyan, this style of process politics is subject to a method of "disjointed incrementalism", which makes a virtue out of ignoring long-term goals or, arguably, continuity of policy. This can be recognised as finding short-term solutions compatible with "business as usual" and a public discourse framed with limited options: for example, framing the choices for climate change response as a carbon tax or an emissions trading scheme, and the range of other responses not mentioned or accepted.

What these authors call "muddling through" is almost guaranteed they say, to generate the "tragedy of the commons" where no-one is looking after the common space as all seek individual advantage in what they perceive as a growing economy. Global warming is the "perfect illustration" of this dilemma that favours "business as usual", which will bring on the "greenhouse effect almost by default" (Ophuls & Boyan, 1998, p. 193–194).

In the next chapter I look at the agenda setting influence of the media during the study period and also at the structural features of the media that influenced the framing of the dominant narrative over time.

Box 3

Postscript: Catastrophic Discourse Change

"Kevin Rudd has put his ideological spin on the global crisis—arguing the great neo-liberal experiment of the past 30 years represented by Thatcher, Reagan, Greenspan and John Howard has failed..."
Kelly, 2009, p. 1.

Writing in the February 2009 issue of *The Monthly* magazine, then Prime Minister Kevin Rudd put the case that the previous neo-liberal ideology of economic management and governance was indeed anti-tax, anti-regulation, anti-government itself and opposed to the investment in public goods, while believing in unregulated markets. (p. 4). A lead story report (previewing the Prime Minister's essay) by *The Australian's* political editor Paul Kelly appeared at the end of January 2009. As the world's financial and stock markets plummeted, the discourse changed with startling rapidity. A week later, *Time* magazine offered a straightforward revisiting of the criticisms of capitalism by Karl Marx (Gumbel, 2009). Columbia University economist Jeffrey Sachs, one of the architects of the neo-liberal global experiment, wrote "The Case for Bigger Government" in the same magazine (Sachs, 2009).

These examples demonstrate that status quo frames and rhetoric can change in short order when social conditions warrant it.

CHAPTER SEVEN
FRAMING THE DOMINANT NARRATIVE—INFLUENCES II: THE ROLE OF MEDIA IN AGENDA-SETTING AND PUBLIC AWARENESS

INTRODUCTION

As Russell (2006) and Palfreman (2006) have found from research with audiences, the public gets most of its science information from the mass media. Therefore structural influences are worth reviewing within the news media and journalism. These internal factors are important to understanding media approaches to science and society topics like climate change and to understanding *why* the dominant narrative becomes what it does as the media interacts in agenda-setting with the political/ideological influences explored in the previous chapter.

Corbett and Durfee (2004) and Palfreman (2006) both offered reviews of the literature on the question of public understanding of climate change science and media communication through the mid to late 1990s. These studies through content analysis, focus groups, and other measurement tools have explored media translation of this issue, asking what the public is "getting" from media reports. The frequent conclusion is public confusion about the causes, effects, risks, and reality of anthropogenic climate change.

In this enquiry I apply the theory of agenda-setting and assume that it is not only the media that influences public discourses and views of "reality", but rather that it is a flexible interplay between media and other "elite" voices—primarily political voices—that guide the daily dominant narrative for public consumption. The evidence in the literature and from this enquiry suggests that whether the public is confused and apathetic is highly influenced by this dominant narrative and also by public relations strategies applied by elite players, including targeted scepticism to foster uncertainty. The media's role is the subject of this chapter. I first review relevant multi-disciplinary literature that sets the background to the media influence and, in regard to media sources, look at the results of the quantitative pilot study described in Chapter 3. I then

proceed with further qualitative documentary analysis to show how framing was deployed and agendas set in the media during the study period.

BACKGROUND

Elites Set the Agenda

University of Melbourne sociologist Lesley Johnson explored media communication and elite agenda setting in Australia via the early days of radio programming and radio serials. She found that mass communication as it evolved in Australia has always communicated most effectively to the "consumer" end of the interest spectrum, and in this way political activity and public discourse have been organised around consumption activity. This sheds some light on why rhetoric about costs and economic appeals generally are potent political tools. Furthermore, she found that "self censorship of the media helped define acceptable world views and public discourse" (Johnson, 1987, p. 75). Johnson proposed that Australian politics is treated by the public as a private choice between political leaders, who are "consumed" at home via the radio and print media, and more recently via TV and talkback radio. This is not a profile of an active body politic other than at election time.

Research on how "issues" in Australia are decided by elites supports both Johnson's finding, and discussion of vested interests and decision-making on climate change at the government level in the study period. Higsley, Deacon, and Smart (1979) wrote that the data on Australian politics are "consistent with … the so-called theory of democratic elitism" (p. 218). This proposes that elites in societies such as Australia maintain minimal democratic standards because they remain accountable to "the people" through periodic elections. However, between elections, policy outcomes are the result of political influences in which elites are the primary participants.

Several questions arise. Firstly, has anything changed since these analyses from 40-50 years ago? Secondly, how does the elite politics interact with the media? The evidence in the previous chapter looking at policy-making, hegemonic ideology, and the climate change story, indicates that this basic elite paradigm has not changed. How then does it intersect with the media?

Theory of Agenda Setting

Australian political science studies since the 1970s have suggested that in this country, with an elite and top-down political system of governance, the media and politicians together set the daily agenda of what is newsworthy and what is the dominant narrative. Ward (2001) described agenda setting as the media's role with public policy and as the cumulative impact of the news media in indicating what issues are important. However, he notes, little actual research had been conducted in Australia demonstrating cause and effect. Nevertheless, "Theories of agenda setting proceed from the premise that the news media are necessarily selective in their reporting of politics and public issues" (Ward, 2001, p. 49) and that the media routinely make "gate keeping" judgments about which issues to report or not, as well as deciding placement and frequency of coverage.

The product of agenda setting is called the "dominant narrative" in the present study. I attempt to show how structural factors within mass media interplay with policy-makers or politicians to set the daily agenda for the public. This agenda setting defines the dominant "way of looking at things" and perceiving social reality. It therefore also affects how science findings are portrayed.

Culture, Commerce, and the Mass Media

In the decades leading up to and including the study period, the US has been the heartland of transnational media and has therefore spawned the most critiques. Carey (1987) has shown how Australia gained many cultural and mass communication influences from the US relevant to this discussion. Australia also frequently shares political world views with the US expressed in agenda setting. Wheelwright (1987) argued it is therefore important to review some of the scholarly critiques that come from the US or North America.

In the late 1960s communications professor Herbert I. Shiller from the University of California wrote about the connection between mass media and American-style commerce and consumption. The connection is framed as the presence of freedom—in trade, speech, and enterprise. In the war of ideas that has accompanied the resurgence of

neo-liberal economics since the 1970s, this also came to include freedom *from* government regulation of business in the public interest (Shiller, 1992).

Technology has greatly aided the spread of these cultural influences and their ability to frame "reality". As early as 1951, Canadian communications theorist Marshall McLuhan noted the commercial and propaganda value of the emerging audiovisual media (television broadcasting only gained traction in the 1950s) saying they provide the viewer with a ready-made image of reality (McLuhan, 1967, p. vi). McLuhan believed that the story-telling devices of mass communication conspired to lull audiences into being passive consumers of culture. He characterised newspapers as the daily "book" of industrial man, telling thousands of stories to an anonymous audience. Storytelling and personal drama were the mechanisms such that "even international politics are made a mirror for private passions—love, hate, deceit, ambition, disappointment are the persistent score backing national and international events" (McLuhan, 1967, p. 5). In this analysis one can recognise the story-telling features that came to dominate journalistic practice as we know it: heroes and villains, two sides to every story, and thereby the creation of drama and conflict—with this kind of "balance" being applied even to scientific stories in the 1990s.

In Australia, Ward (2001) reviewed the literature that casts journalism as a narrative or storytelling about the world around us. He concluded that conflict and "balance" are two driving forces, and that journalists do not randomly choose the heroes and villains in their stories.

> The news frames they routinely use are not ideologically neutral in what they hold out as right and wrong. For example striking workers, political protesters, forceful feminists, Leftists, gays and Greenies will rarely be cast as heroes. Conversely, successful businessmen, employer associations, archbishops, judges and prominent—especially conservative—politicians are rarely villains. (p. 113)

Given that spectrum, the role of environmental scientist within the study period, and particularly since, has arguably swung from the more heroic, or at least elite and unquestioned, to that of a fair target of attack. A number of controversial science and society issues during the 1990s, including the science role in mad cow disease, the genetically modified crops debate, and probably the spectre of climate change, are likely

to have been influential in such a shift. Bulkeley (2000a, 2001) noted a reversion in the climate change story after the Hawke government i.e., by the early 1990s, to a familiar narrative for Australia—the conflict between long-standing beliefs about business and development in opposition to "green" views of limits and conservation, including climate science messages (also Pearse, 2007).

Another Canadian, Dallas W. Smythe, one-time chief economist for the Canadian Federal Communications Commission, proposed in a 1981 book that the purpose of mass media and communication is to set a daily agenda of issues, values and policies (Smythe, 1981). He was one of the first to note that media companies mass-produce audiences and sell them to advertisers, and recognised that the mass media are a central means of forming attitudes, values, and buying behaviour. Globally, "cultural screens" have been exported along with trade goods or imperialist takeovers for the past century" (in Wheelwright & Buckley, 1987, pp. 5–6). Thus, according to McLuhan, Smythe and others, the mass communication media turn issues into stories that reinforce the dominant commercial or ideological agenda—or "ideologically organised discourse".[50] Canadian social philosopher Ronald Wright (2004) describes the same concept as cultural myths that societies live by, and describes "progress" and related no-limits beliefs as the driving myths of Judeo-Christian cultures and economies.

Informal daily media monitoring and examples gathered for this project clearly indicate that agendas and issues can be changed and manipulated by political and business elites and their public relations advisers, and the task is made simpler by the news media practice of discovering an issue when politicians make it one. For example, the very sudden and heavily discussed arrival of nuclear power in the climate change discourse following the study period became an instant issue in 2006 because Prime Minister John Howard and his Cabinet talked about it as described in *The Age* newspaper (Murphy, 2006) and other news publications of that year. That example is consistent with the finding by Klapper (1960) that "the media are more likely to reinforce than change"(in Ward, 2001 p.38), but that is not always the case.

Robinson (2000) built on earlier work to develop a policy and media interaction model. He used humanitarian crises as case studies, and found that when the government policy line is clear and certain (and dramatic—like sending troops) it tends to set the news

[50] A term coined by Australian scholars and used by Ward (2001, p.39).

agenda; but when it is uncertain (or perhaps considered boring), the media can and do set the agenda (cited in Barker, 2005). Barker canvasses media research up to 2005 to conclude:

> Media corporations, acting as powerful corporate bodies, engage with credentialed policymakers to set both the policy agendas and the legitimate terms of discussion … powerful interests may still challenge official positions, but this will take place through more formal lobbying channels, well concealed from the prying eyes of the media. (Barker, 2005, p.6)

Rosenbloom (1978) and more recent media analysts and media workers further link the press' decisions to the ability of citizens to make choices in a democracy. BBC editor Kevin Marsh, for example, is quoted as saying that choices and omissions made by "the press" affect democracy by limiting informed decision-making and by ignoring its primary professional responsibility to report in the public interest (Beecher, 2005, p.13).

US media analyst Susan J. Douglas concludes that the mix of fact, opinion and public relations that has characterised much of media "news" in recent decades means millions of people struggle daily to decipher what is fact and what is spin and that "in this environment everything is spin and laws and facts are cast as debatable, mere opinions," (Douglas, 2006, p. 14).

Loss of Media Diversity and Capacity to Influence with Ideas

The agenda-setting capacity of the media with policy-makers has intensified with loss of diversity in media companies. Economist Ted Wheelwright, introducing a selection of left-leaning critical analyses, places the Australian media in a multinational business context as a result of a wave of media mergers resulting in a loss of diversity during the 1980s simultaneously with the spread in global business links. He writes: "The services sector of the world economy, which includes communications and media, is now its largest and most dynamic sector" (Wheelwright & Buckley, 1987, p. 7).

This collection of analyses, and other 1980s and 1990s research work such as Ward's, provides a useful historical perspective. They reflect a transition from a more diverse economic and political spectrum—at least in terms of media publications and

programs—to one that became increasingly dominated by the hegemony of neo-liberal conservative ideas. This outcome was more possible because of media concentration in fewer hands. Australia now has one of the least diverse media scenes in the world (Manne, 2005). These situations came to be considered the norm in the later study period.

Journalism and commentary have reflected these trends. Rundle (2005) reflects on the Australian media scene since the 1960s and the more pluralistic journalism of earlier decades. He contends this plurality of voices has steadily eroded in part due to the prominence of conservative commentators and radio talkback hosts, such as John Laws and Alan Jones, who amplified a neo-liberal narrative and assisted the spread of this ideology to hegemonic proportions, along with the News Limited press—both influences discussed briefly later in this chapter. The same neo-liberal narrative was evident in the political rhetoric promoting the economic rationalist "reforms" of the late 1980s and 1990s, discussed in chapter 5.

In his book on the emerging new understanding of biological and cultural systems and networks, physicist and philosopher of science Fritjof Capra (2003) provides a global perspective on how "reality" is manufactured. He writes: "The culture we create and sustain with our networks of communication includes not only our values, beliefs and rules of conduct, but also our very perception of reality" (p.136).

Similar conclusions about the changeable nature of "reality" emerge from this thesis' investigation of framing and communication. Therefore, my working hypothesis is that daily "reality" is not a set thing but is framed by mass media corporations in conjunction with business and political elites, reflecting their values and beliefs. Together they set the agenda and frame the dominant narrative.

Development of the Internet Coincides with Study Period

Development of the internet and the avalanche of information it has deposited globally coincides with the study period i.e., starting from the early 1990s. This coincidental rise of the dominant communication platform of the modern world must surely have had, and continues to have, an influence on the public understanding of climate change science—sceptic websites being just one example. The internet has greatly broadened

again the diversity of information potentially available. However, many interesting questions arise, for example: how uses of the internet shape peoples' understanding of reality, virtual and actual; how the internet influences the flow of information from scientist to public; how internet sites have influenced the overall public trust of the science given greatly fragmented audiences (compared with even 30 years ago) who can select to "hear" only a narrow range of information. How does this smorgasbord of information relate to a growing dominance of belief and opinion replacing evidence-based facts in the public and political discourse observable in the past decade? These questions are noted but await further exploration.

Media Structural Influences on the Dominant Narrative

An important aspect of the media influence on a dominant narrative and agenda is the media's internal workings or structural factors, which are not value-free (Nichols & McChesney, 2005; Ward, 2001). A brief historical review shows how the journalistic profession has diverged over time from the media's traditional role in participatory democracies.

According to Nichols and McChesney (2005) a "free" press and the free flow of information were considered fundamental to the functioning of democracy as republican nations were built in the 18th and 19th centuries. The press was the watchdog of liberty. "Free" meant fearless and without commercial or political interference—this was possible because many papers were actually government-subsidised early on in the US, but the concept stuck. It also meant there was a great deal of diversity. It was common to "contextualise" political issues so that citizens could recognise seemingly random events as part of a coherent pattern and, as the authors note, this approach tends to draw people into public life. By the mid-20th century, journalism developed as a profession that was evidence-based.

The mergers and acquisitions of the past 30 years changed much of that, and mass media became predominantly a multinational business enterprise that saw the gathering of news and issue exploration as subservient to profit-making agendas. I argue in this thesis—as have Manne (2005) and McKnight (2005) in their exploration of Australian news gathering, that news selection in recent decades has often become entwined with ideology related to free-market ideas and agendas. Reinecke (1987) studied the

consolidation of media power in Australia augmented by rapidly changing technology (a situation in regard to technology that has only accelerated since the 1980s, particularly with the advent of the internet). He suggests that increased technological access to information has not made for a better-informed public because the technological advances have been harnessed to the needs of profit and often reflect "ideological orthodoxies". Twenty-five years ago he observed:

> The information with which citizens are flooded is more likely to be what they require to promote their material advancement, rather than helping them to question the society they live in. Instead of liberating them, the existing types and forms of information tend to immobilise people and create political apathy (Reinecke. (1987, p.10)

Along with the mergers and acquisitions, and loss of diversity of Australian print and broadcast media there has been another major shift—within the profession itself. Professional journalism developed low-risk approaches to newsgathering and called it "objective and unbiased" journalism (Bagdikian, 2004; Nichols & McChesney, 2005).

Influential Media Practices

Some common practices, or internal structural features of newsgathering, have a direct bearing on the communication of science, or science and society stories, and with it the communication of anthropogenic climate change during the study period. Ward and other media researchers (and my personal observations as a professional in the field) note that Australian reporting and editing practices reflect similar structural formalities and institutional limitations as US researchers have identified – source journalism, contrived balance, lack of context. Therefore I analysed in the sampled newspaper evidence these three practices: reporting what influential (political or other societal elite) sources say are the "facts" on a matter; using or omitting context; and establishing an artificial balance to create interest. I will provide some examples from the middle of the decade that illustrate how these practices were used quite differently by the two news organisations sampled.

The documentary evidence shows a more science-focused coverage until the mid-1990s as detailed in chapter 4. Thereafter, the predominant media focus in Australia, as in the

US, became the policy/economic debate about climate change response as reviewed in Chapter 5. Political reporters thus came to the forefront. Pulitzer Prize-winning political journalist Ross Gelbspan (2004) suggests that the dominance of politics in the evolving climate change story had another internal logic: this was the perceived elite career path for journalists covering politics. Gelbspan sees this as putting scientists and their public interest messages at a remove. Since the science message did not change significantly from beginning to end of the study period, the evidence I explore in this thesis also suggests later communication of climate science reflected a reframe of this message through the values and beliefs of policy-makers, politicians, political journalists, and editors, variously and together. This is consistent with the theory of elite agenda-setting and also with the theory of how hegemony is imposed, as well as with framing analysis.

Examples from the documentary record suggests that a change to a more political focus was incremental and occurred differently in the two newspapers sampled, *The Sydney Morning Herald* (SMH) and *The Australian Financial Review* (Fin Review). The latter started focusing on the political and economic story much earlier than the SMH, arguably consistent with the Fin Review's business readership. Newspaper coverage sampled until 1996 in the SMH showed that science and technology reporters remained well aware of the risks posed by climate change and the dangers posed by Australia's economic path—emissions from the coal industry for example.

Thirty reports sampled in the second half of 1995 and the first half of 1996 on the topic of climate change almost all focused on the science and risk messages as well as on international negotiations or Australian economy's dependence on coal exports. For example headlines included: "Malaria Spread Linked to Climate Change" (Dayton, 1995); "Climate Change a Fact: Experts"—a report syndicated from *The New York Times* about the 1995 IPCC assessment; A January 1996 report with the headline "Plummeting Penguin Numbers a Crisis on Macquarie Island" explained wildlife losses as Antarctic waters warmed. "Global warming a warning that we must act" by scientist Ian Lowe, was counted in this analysis as an opinion feature (defined as not written by a staff or freelance journalist). There were no sceptic opinion pieces in these samples.

"Australian Ploy Fails to Slow Greenhouse Action" by SMH technology writer Gavin Gilchrist illustrates how a political story that does frame in context with the scientific background can work to heighten understanding. Gilchrist wrote:

> Australia has sought to weaken international efforts to tackle the greenhouse effect by trying to undermine a landmark scientific report that calls for immediate action to ward off global climate change.
> It is the third time this year the Federal Government has tried to delay international action on the greenhouse effect: in March, a botched diplomatic strategy at the Berlin climate convention was not adopted, and in August it emerged that the same diplomatic strategy was being pursued using an economic study partly funded by the coal industry.
>
> (three paragraphs later)
>
> For the first time, the world's governments will be advised that the risk from climate change is so great that immediate action is warranted beyond measures which make economic sense, such as improving the efficiency of energy use by industry. (Gilchrist, 1995, p.1)

In the same year, Gilchrist also wrote about a CSIRO report with the headline "Greenhouse Effect Will Cause Havoc in NSW, Study Claims" (Gilchrist, 1995a). Increased risk of severe thunderstorms and torrential rains are a prominent theme of this report, again providing evidence that likely impacts were understood and reported. Amongst the CSIRO findings Gilchrist wrote:

> Sydney will suffer twice as many days of extreme heat, four times as many severe storms and far worse flooding from huge increases in torrential rain, according to the latest predictions of how NSW will fare under the greenhouse effect. (Gilchrist, 1995a, p.5)

Another SMH science reporter, Bob Beale, examined the planning process for coal mine development in NSW and offered graphic statistics on the impact of Australia's coal focus. He wrote that although, "it would take 420 million new trees to soak up the estimated 281 million tonnes of greenhouse gases produced by the Hunter Valley's

proposed Bengalla coal mine, according to calculations by a Federal Government bureau", mine-lifetime greenhouse emissions were not being assessed as new mines were opened (Beale, 1996, p.9). In this case the information source was a government report that put coal mine development in a greenhouse gas context; more often SMH sources were individual scientists or politicians in this period.

With a Federal Government change in 1996 to the "conservative" political party in Australia and with this Liberal-National Party Coalition government led by John Howard continuing until 2007, the evidence indicates that climate change became increasingly framed as a political/economic story of Australia blocking climate action internationally. Gilchrist reported in the SMH that:

> The Howard Government today steps up its diplomatic offensive opposing international efforts to protect the world's climate at the historic meeting of the Climate Change Convention in Geneva.
> Australia, with its pro-industry stance, is set to be seen as a rebel nation out of step with mounting global concern about the threat of climate change from the greenhouse effect. (Gilchrist, 1996a)

He uses a scientific context of risk in this story as well, citing the 1995 IPCC report, and he also adds context with a background report on the economic direction of backing status quo energy producers and users and the traditional "economy versus environment" values that characterised the new Howard government's "pro-industry" stance on greenhouse gas emissions—also examined earlier in this thesis. This article thus outlines another pivotal shift in communication and framing in Australia's response to climate change science and describes the revolving door of like-minded executives between bureaucracy and industry setting the political agenda, a story also told by Pearse (2007) a decade later. This article in full is in appendix 1.

Although the SMH continued to run well-informed and contextual science stories during the later study period, a framing shift is suggested from the sampling. Along with the change of government in 1996, there began relatively more political/economic coverage. This can be seen starting from 7 June 1996 and during the following six months where a SMH editorial and five of six articles are all focused on international negotiations.

Looking at the same two year period for Fin Review one finds that amongst 30 articles sampled in 1995–96, there are only four articles focused on the science. One is on a technical issue and is an opinion piece (defined as not written by a staff or freelance journalist) and three are opinion pieces by sceptics. The same sceptical approach to the science was not the case in the early study period when the sampling showed the Fin Review ran a mix of straight-forward science reporting, defined as quoting mainstream climate scientists, and political/economic stories, some of which were candid about Australian industry's inefficiencies, as I showed in chapter 4. By 1995 the economic concerns of energy producers and big electricity users like aluminium predominated along with international negotiations. Unlike Gilchrist's SMH stories, they are not framed in the context of IPCC assessments, i.e. scientific background.

A trend in these articles is that besides politicians, sources frequently include industry spokespeople urging the government to heed their concerns or agreeing with government about what is in Australia's "national interest", with conservation group spokespeople in opposition. The latter supports an observation that after the early study period the science information on risk and need for speedy response was more often represented by green groups. Three opinion pieces by sceptics were published in 1996––by US scientist Michael Patrick, National Party politician John Stone and former Labor Minister Peter Walsh, (later to become a prominent member of the Lavoisier Group).

Many Fin Review headlines in 1995 relate to fears of a carbon tax by mining and energy producers and providers, or, indeed, of any tax or international regulation that limited emissions. Here is evidence that even before the change of government in 1996 industry and government had already been reframing Australia's position from the early ethical, response-focused and internationally cooperative stance to an economic self-interest stance that ignored the risk messages. In addition to Fin Review articles from this period quoted elsewhere, headlines include "Business in last ditch bid to bar carbon tax" (Callick, 1995); "Australia takes strong line against greenhouse rules" (Dwyer, 1995); "Business Lines up to Fight Controls" (Callick, 1996) has an indicative series of quotes from industry spokespersons. Similar framing can be found in "Macquarie fears a greenhouse handicap" (Callick, 1996a) where the rhetoric of the investment sector is quoted and this is later countered by a Greenpeace spokesperson. Callick writes:

> Policy options on combatting climate change that are still before the Federal Government 'could destroy the competitive advantage of Australian mineral processing companies', according to Macquarie Equities Ltd

(and)

> The practical outcome, Macquarie said, would be "the loss of significant new investment in the Australian resource industry". Australian energy and commodity producers would come under increasing pressure to conform to the policy stance of Europe and the US as negotiations proceeded. …… The Europeans' position was driven by trade competitiveness objectives, the Americans' by the presidential election. (Callick 1996a, p.4)

The construction of a story about either an industry point of view or a federal government point of view countered by an environmental group later in the story is common amongst the Fin Review stories sampled from this period. This construction of a story reinforces the frame of "mainstream" (that is, industry-or politician) versus special interest, the environmental group opposing business and jobs. This article exhibits a number of value frames discussed in chapters 5 and 6—the rhetoric about Australia's competitive advantage, that if action is taken industry will go offshore and that "outside" attempts to initiate emission reductions are self-serving and not in Australia's interests. In this way political and economic reporting was establishing the dominant narrative for the following years.

The examples reviewed variously illustrate a common media practice highlighted by media researchers: stories are framed as authoritative and "objective" when they report on what people in power say and do. Political utterances can and do set the daily news cycle and issue agenda (Gelbspan, 2004; Nichols & McChesney, 2005). Reporting political debates is presented as removing bias from story selection, and it makes newsgathering less expensive. News companies set up reporters near powerful people e.g., in parliamentary press galleries. While this may reduce journalism to networking and scribing or opinion pieces, it is safe.

In Australia the federal parliamentary press gallery dominates the daily news coverage. On any given day political back and forth is the majority of what is relayed by the national broadcasters, ABC and SBS, as well as the major broadsheets. Understanding this political reporter–politician nexus makes the agenda-setting role of governments *with* the media more transparent on analysis. It also sheds light on why political leadership becomes so important in transmission of a controversial science story.

Politicians as primary framers of the topic by the later 1990s and beyond can be seen in the coverage of the two newspapers analysed and also from interview data. When no politician was talking about climate change, editors were liable to assume there was no story, according to SMH journalist Wendy Frew and Fin Review journalist Julie Macken who wrote separately about their on-the-job observations in the professional journal *The Walkley Magazine* (Frew, 2006; Macken, 2006).

Getting a story placed in the newspaper is a hurdle in itself in the internal structure and is related to the power of the editor and also often is subject to the values of the editor. Editors are appointed—it is suggested by Gelbspan and Nichols and McChesney—because their values are coherent with the dominant ideological culture of the media group ownership and board. I suggest that media ideological agreement with policymakers about Australia's "comparative advantages" in export trade that made the country exceptional, per economic rationalist theory, grew to hegemony during the later 1990s in Australia's highly concentrated media market.

Frew reports that in her experience as an environmental journalist in the mid-2000s, after the first decade of the federal Howard Government, with political correspondents uninterested in the topic except as an international battle:

> Climate change has been one of the most difficult stories to sell to my news desk since I took on the environment round 18 months ago. Scientists and environmentalists were in no doubt it was a phenomenon like no other, and one that had dire consequences for the world's population. But with the exception of a few dramatic reports … news editors weren't interested. (Frew, 2006, p. 18)[51]

[51] The national press gallery in Australia generally ignored climate change in the late 1990s, as did the politicians, apart from the political battle over the Kyoto Protocol. This continued well into the 2000s, until recently (Sanderson, 2006). How it might be different was shown with the avowed turnaround of News Limited owner Rupert Murdoch on the topic in 2007 (reported nationally and internationally

A similar observation comes from former ABC television environment reporter Alan Tate who said in a 2006 thesis interview that the influential (to editors) Canberra press gallery took its climate change information from the government. A former journalist from *The Age* who took the subject seriously and responsibly in the mid-1990s, said that when she suggested a climate change story her editor responded: "haven't we fixed that?" She also said she was labelled a "greenie" (C. Miller, thesis interview, April, 2007). Another reporter who covered climate change for the SMH in the later 1990s, Murray Hogarth, said "We were a lonely bunch in the 1990s—I knew of no editor who was committed to telling the story" (M. Hogarth, thesis interview, June, 2006).

On the related subject of "source" journalism in Australia, Ward (2001) says:

> Many of these explorations of reporter-source relations have suggested that journalists are readily captured by the official or bureaucratic sources they routinely rely on for information that they can speedily fashion into news stories. Government and corporate sources are hence able to shape the media agenda: they become "primary definers" of the news. (pp. 177–178)

An example given by Gelbspan of how this worked in the US is that when the US National Academy of Science (NAS) supported and strengthened the advice of the 2001 IPCC report (in response to an argument about "foreign" versus "American" science raised by then President George W. Bush), "…few if any reporters bothered to check the position of the NAS. Had they done so, they would have found that as early as *1992* … the NAS recommended strong measures to minimize climate impacts," (Gelbspan, 2004, p. 70).

A Shift to Opinion by 2001 and Uncertainty

By 2000-2001, the 30 samples from the SMH and the Fin Review respectively for those years show a shift to opinion balanced against the science and continued political

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May 9, 2007 e.g., Griscom Little, (2007a). We suddenly find *The Australian's* national affairs reporter cutting through the government rhetoric and giving a cogent account of the real economics attached to mitigation, although the headline "Green row will be decided on economic fear" still makes it sound like a green sectoral issue (Steketee, 2007).

coverage. Numbers of news stories sampled remained comparable from 1987 to 2001, although drawn from a larger pool of stories in the early study period. Content continued to change towards uncertainty. The Fin Review was regularly calling global warming/climate change "a debate" in the 2000-2001 stories sampled and continued to quote sceptics as the science context. The common trend by this time to dismiss alternative energy solutions as marginal and non-mainstream can be seen in reporter Nick Hordern's (2000) piece. He describes renewable energy as a manifestation of "green politics" and "subjectivity" that "few energy analysts" agree with.

As shown in Figure 10, a comparative analysis of sources for 30 SMH articles taken from the beginning (1988–89) and then 30 articles from the end (2000–2001) of the study period found that the number of opinion pieces had gone up tenfold by 2001 from a level close to zero in 1988–1989. Journalists' reports about climate science in the period 2000–2001 were at times placed on or near the opinion pages where sceptical tracts also appeared if not on the same day. This emphasised debate, opinion, and uncertainty about who to believe. The samples also suggest that by the end of the study period this newspaper was quoting green groups and NGOs three times as often as in the early days. The use of scientists and experts as sources had declined about 20% from the early study period. This is consistent with the impression that green groups were quoted more often in an adversarial role to the government's position. However, named politicians and industry spokespeople as sources had also gone down based on this sample.

Figure 10 Comparison of Sydney Morning Herald articles 1988–89 and 2000–2001

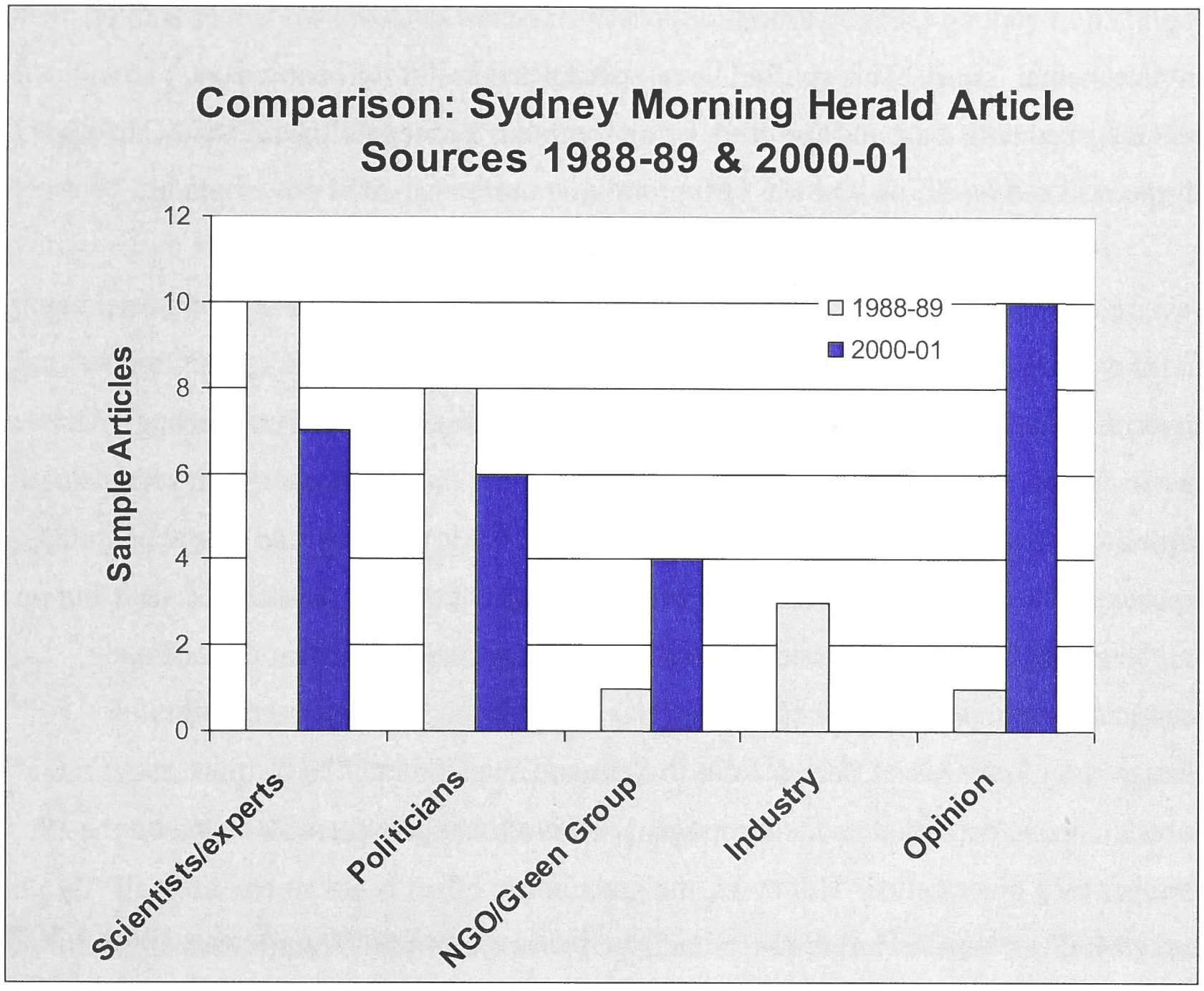

Figure 10. Sources for newspaper articles in *The Sydney Morning Herald* comparing 1988–1989 and 2000–2001

The opinion articles, again defined as not being produced by a staff journalist, were produced by writers who either supported the science risk messages or debated them. Increased opinion articles signalled that the mainstream science findings were in the realm of debate, on a par with opinion. I suggest such approaches encouraged uncertainty, keeping in mind also the impact of the wider communication picture, not least the internet's wealth of opinion-based sites established during the 1990s.

In more detail, 2000 yielded a notable crop of opinion articles in this sampling of the SMH. No IPCC reports would be issued until the start of the following year and it was not a year of major treaty negotiations until near the end. Instead, the year started with a January article about what a politician thought "We're dancing on our graves Bob Carr

warns", a cautionary tale about over-population, global warming and environmental degradation quoting the then Premier of NSW Bob Carr who was known to lead on environmental issues. This spurred three opinion articles in following days, two of which agreed with Carr and the third, by a prominent Sydney politician, said Carr was all rhetoric and no action and was still promoting more coal-fired power plants.

Several articles followed where climate change was an aside in coverage of gardening and travelling ("if global warming occurs", this or that might happen). The Carr government was again invoked in July with an environment story about endangered species "Life's getting too hot for endangered species" citing a government scientific committee. Starting in September, a number of science articles written by either staff reporters or freelancers were interspersed with sceptical tracts—on different days but on neighbouring feature and opinion pages—lending the impression that science and sceptical opinion are evenly balanced. Thus two science features—about climate change risks to the Great Barrier Reef (6 September) and on the 10 October about links between ozone depletion and anthropogenic climate change—were followed on the 19 October by a piece called "Hot news, the greenhouse effect is not so bad after all" by Larry Mounser who is credited as "a freelance writer, a physics teacher and runs a course." Mounser returned again later in the year.

He argued that since the climate in recent geological time is a series of ice ages with brief interglacials "The onset of an ice age could take just 70 years. Being able to avert it by burning fossil fuels, purposely creating a 'greenhouse effect, could be one of the luckiest flukes in human history. Yet, strangely, it's the warming of the planet that we fear". He wrote that documented natural temperature variations with the Arctic losing ice have caused no ecosystem harm and furthermore "there's also no hard proof that CO_2 is causing the warming anyway," (Mounser, 2001, p. 12).

On 13 November several greenhouse-related articles appeared at the front of the paper and in the opinion sections. One was a political analysis with a science context but without any quoted sources, thus looking like an opinion piece. Another was a freelance piece stemming from the new career of former technology writer Gavin Gilchrist who quit reporting in the late 1990s to promote sustainable energy, then developed a small company called Big Switch Projects Pty Ltd (Gilchrist, 2001). Several other reporters interviewed for this thesis, including Alan Tate, Murray Hogarth and Claire Miller from

the 1990s, had moved on by 2001 to private careers in sustainable energy promotion or state government. This indicates another influential structural feature of news media—the loss of experienced and well-informed personnel.

One SMH writer who didn't move on was Deborah Smith the science writer. It was her story on the draft 2001 IPCC assessment, placed on 13 November 2000 on p.13 along with the two stories noted above, that was notable as a science update placed in the paper in features next to the opinion pages where Mounser's piece had recently run. Furthermore it was introduced with the words "The relations column will return next week". The subject matter was not opinion but a straight report on the 2001 IPCC assessment. Smith wrote:

> (The IPCC) tone has toughened considerably since (1995), based on new studies. The latest draft report by the 3,000 scientists who make up the Intergovernmental Panel on Climate Change, IPCC, to be finalised early next year, warns that mankind has "contributed substantially to observed warming over the last 50 years". (Smith, 2000, p 13)

Smith also interviewed Graeme Pearman then Chief of CSIRO Atmospheric Research who stressed that the underpinning science was solid and response action should not be delayed on behalf of "a few remaining greenhouse sceptics". In the earlier study period a report on IPCC science would more likely have been main news in the front of the paper. In keeping with the shift to a political debate, in this November 2000 issue, the p. 1 story focused on environmentalist dissatisfaction with the Australian position at the Hague climate change conference that month with the headline "Greens flex their muscles at 'last chance' climate summit", underscoring the government versus the greens frame of the narrative.

Three weeks later on 6 December the sceptical physics teacher appeared again writing about "Cracks in the greenhouse…" claiming hundreds of studies don't support the IPCC, and offering some plausible (to the layperson) alternative perspectives. He used rhetoric like "the high priests" and the "white coated posse" when referring to mainstream climate scientists and this name-calling would be a growing trend. In total six of 16 stories sampled for climate change in 2000 were not by either staff writers or freelance journalists. The opinion articles were about the science and the impact of

climate change, not about federal politics. Along with the effect of story placement, this may arguably have contributed to uncertainty about climate change information.

The SMH samples for 2001 presented fewer opinion pieces and instead a stream of political stories about why the US, supported by Australia, did not want to ratify the Kyoto Protocol. There were also some informative stories linking weather outcomes to climate change. In January 2001 the IPCC assessment, now officially released did get p. 1 treatment emphasizing the risk message in the headline: "Six degrees hotter, global climate alarm bells ring louder."

By 2001, international response negotiations were being framed by both reviewed publications as a battle between environmentalists and the government backed by industry. A Fin Review article in November 2001, "Conservationists fail to expel Australian team", for example, reported on non-government organisation complaints about the Australian negotiating team and its role on Kyoto Protocol negotiations. The government's role is defended by the Aluminium Council's representative John Hannagan. The 2000 and 2001 articles taken together suggest that the whole discourse might be dismissed by audiences as uncertain and debatable or opinion, or as a special interest issue of little concern to the mainstream.

These sample articles also invite a closer look at one of the major media structural influences identified —along with elite/political source journalism, and with avoiding context—that is: contrived balance in presentation of the science. The Australian evidence suggests this can be done by offering opinion pieces to counter or support professional reporting of events or scientific research outcomes. In Australian newspapers sampled it was also done by offering diametrically opposed views on the significance of the science findings on risk.

Manufacturing Balance

Political scientists Jules and Maxwell Boykoff (Boykoff & Boykoff, 2004) looked at coverage of global warming during the study period (1988–2002) in nationally-read US newspapers. They used content analysis to look at the effect of "balancing" a single media report on this topic. They found, perhaps unsurprisingly, that this adherence to balance—i.e., finding two competing voices but not necessarily with context—actually

biased the coverage of anthropogenic climate change and issues related to response, and led to uncertainty.

US human geographer Liisa Antilla (2005) did a similar study, and provides a wide-ranging bibliography on newsroom practices and climate science communication. Her one-year study encompassed a survey of US newspaper national and regional coverage in 2003–2004 looking at factors like uncertainty and the exploitation of media practices such as balance by non-peer-reviewed sceptics to create a "phony controversy". She arrived at findings complementary to Boykoff and Boykoff about the skewed information going out to the public, and points to historical precedents for manufactured uncertainty and controversy on controversial social issues from slavery to cigarette smoking.

As I show, similar conventions developed in Australia and this led at times to "balancing" the body of peer-reviewed reports assessed by the IPCC with isolated voices of sceptical scientists—a balance of voices that should have been placed in the context of a consensus agreement by climate scientists working in that field (Oreskes, 2004). Often, the sceptical voices are not scientists—as in a September 2000 article in the Fin Review by a "former senior public servant" who quotes a small handful of armchair Australian sceptics like Tasmanian John Daly and tells his readers that "scientifically the greenhouse scare is largely over" (Scott, 2000, p.34).

Context Avoided or Used Strategically

Context is often avoided in news reporting and this has been another confusing influence on climate change stories. Ostensibly this happens so that there is no possibility of a charge of bias against the reporter who might add the context (Nichols & McChesney, 2005). Applying context is also more time consuming, as it requires research and/or experience. Instead, the standard, "objective" and balanced approach reflects as a "he said", "she said" array of facts and opinions—possibly assembled in a number of consecutive news stories, but without background as to where this information fits in the ongoing evidence or science discovery process. Similarly, context is often omitted for people quoted or interviewed—for example, whether they speak for a peer-reviewed research summary in the case of scientists. A related omission is an interviewee's affiliation or research background that might illuminate where their

comment is coming from. Rarely does a news report include either a sceptic's or a mainstream scientist's credentials or a relevant link to a particular interest group or think tank. These omissions arguably encourage the public notion that scientists are interchangeable.

Corbett and Durfee (2004) showed that news consumption without context does not lead to better public understanding. Testing a sample audience with various treatments of a global warming story, they found controversy added to readers' confusion—while context made people feel more certain they understood global warming and that it was real but complex.

Science context was often missing in the Australian political stories sampled, although sometimes it was inserted strategically to remind audiences of the scientific risk messages (e.g. SMH articles from 1995-96 described previously). The reverse effect was also achieved by structuring a political article with sceptical science context (e.g. Fin Review articles 2000). Since the uncertainty discussion involved opinion that sought to discredit the IPCC, (e.g. Scott 2000) a year's worth of articles might have the effect of leaving readers uncertain about who to believe. In these ways, context can either be missing or misused, as well as being used with professional ethics as the experiment by Corbett and Durfee assumed.

Australian academics have also noted the atomised nature of modern news presentation. For example, University of Sydney professor of government Rodney Tiffen wrote early in the study period: "The fragmentary formats of news presentations amid conflicting claims are apparently cognitively disabling for many. There is vividness without context, information without accountability, variety without enhancing the sense of choice or control" (Tiffen, 1989, p. 197). Almost 20 years later, Nichols and McChesney (2005) agree:

> Professional journalism tends to pummel people with facts, but rarely pummels people with a nuanced appreciation of what the facts might mean. This helps explain the numerous studies that show that sustained consumption of the news on a particular subject often does not lead to a better understanding of the subject and sometimes leads to more confusion (p. 19).

Commercial Pressures and Ignoring the "Dots"

Commercial considerations also shaped the agenda. Gelbspan reports an October 1999 conversation with a top editor of a major US TV network who was asked why the dots were not connected between increased coverage of weather disasters and climate change. The editor said on the one occasion where they tried it, a barrage of complaints was aimed at the top network executives from the industry-funded Global Climate Coalition.

The fossil fuel industry argument then, and still now, is that any one event cannot be linked to human-induced climate change; even mentioning that scientists linked a "pattern" of violent weather with climate change was deemed offensive. The editor said the network was intimidated. "The threat was implicit: if the network persisted, it ran the risk of losing a lot of lucrative oil and auto advertising dollars" (Gelbspan, 2004, p. 80). (This tactical insistence on uncertainty is further explored in chapter 9.)

In Australia, ABC reporter Alan Tate said that his editors were also deluged with complaints from the resource extraction industry whenever he covered climate change during the 1990s (A. Tate, thesis interview, June, 2006). While not a commercial threat, it might be considered a political threat to the ABC. It is noteworthy that with recent extreme weather events in Australia such as the cyclone that destroyed Innisfail in 2006, the "Black Saturday" extreme bushfires in Victoria in 2009, and the extreme flooding and cyclones of 2011, a similar lack of "connecting the weather dots" is evident from politicians and media.

Reporting Structure and Agenda-setting "Spin"

Structurally, the way a newspaper or TV news service is organised is in "rounds", and many science and society issues like water and climate change will be covered across different rounds—political and economic, as well as science and environment. This affects the quality of reporting and the contextual understanding of non-science reporters. A SMH journalist working the environment round said that environmental reporters suffer from this cross-over more than in the past because climate change (and water) had become topics that affect many rounds including politics and economics and everyone wants to write about them. However those reporters won't necessarily have

the background and understanding that an environmental or science reporter will have. That can mean that any "spin" in a political press release about an environmental issue might not be noticed or questioned by a non-environmental reporter.

"Spin" was the word used by former ABC environmental reporter Alan Tate when he said high-energy users and production industries—aluminium, coal, electricity, and later fertiliser and cement—were actively setting the agenda of "go slow" on climate action along with federal officials (also documented in the findings of Pearse, 2005 and Hamilton, 2001). "It was the biggest most powerful spin campaign in Australian media history" he said in a 2006 thesis interview. He said he understood the strategy was to delay action on greenhouse gas emissions until "coal was ready"—with geo-sequestration and tax support. He said what he saw of the communication tactics was:

> First sow seeds of doubt about the science—make it a nonsense. Say let's not be part of the Kyoto Protocol—it's too little anyway. Then say OK we've got a techno fix, geo-sequestration and nuclear. Ignore energy efficiency and renewables, why bother, those are green issues, it's all marginal. The Oz main game is coal and cheap energy. (A. Tate, thesis interview, June, 2006)

The historical record of this period, available from published documents and from the works of Pearse (2007), Bulkeley (2001) and Hamilton (2001) amongst others, agrees with Tate's assessment of what was accomplished during the 1990s by both politicians and media: that is the reframe of the dominant narrative by denying, downplaying or confusing the risks of climate change and the cementing of 'business as usual" in concurrence with the resource industry. Former mass media journalist Wayne Sanderson wrote on the political website Crikey in 2006 about the federal press gallery during the Howard government from 1996 on:

> In attempting to dictate the terms of the response to climate change, John Howard is the doctor who denied the disease, but now wants to prescribe the cure. And the press gallery shows every sign of letting him get away with it. In fairness, the gallery may be doing the best they can, given they are intellectually retarded on this subject, having shown little interest in it over the years. Search the archives, in vain, for a serious piece by a serious "insider" on what has been a monumental failure of national public policy.

> As a pack, the gallery has allowed the climate change debate to be framed by the government – first it wasn't happening; then it was happening, but there wasn't much Australia could do; now it is serious and nuclear energy will fix it. At each point, the stance has been either totally wrong, or at least questionable, but the fourth estate has been missing in action (Sanderson, 2006).

Veteran American journalist Bill Moyers, now one of the corporate media's sternest critics, described the current state of a dominant political journalism culture in the US—and it can as easily apply to Australia.

> "Instead of acting as filters for readers and viewers, sifting the truth from the propaganda, reporters and anchors attentively transcribe both sides of the spin—invariably failing to provide context, background, or any sense of which claims hold up and which are misleading" (quoted in Nichols & McChesney, 2005, p. 25).

WHERE WAS THE PUBLIC BROADCASTER AND THE PUBLIC INTEREST?

The question also arises about the role of the public broadcaster during the study period which I explore briefly here and is a topic worthy of further study. Veteran ABC reporter Allan Ashbolt contends that the ABC's main function is "to legitimise and stabilise the culture and ideology of the present socio-economic system" (Ashbolt, 1987, pp. 14–15) and that the "ABC passively accepts the ideological values passed on by outside institutions". In other words, without the commercial imperative, the public broadcaster may be a more direct reflection of the prevailing government ideology and the agenda of the dominant narratives.

Alan Tate left the ABC in 1998 when he felt deep uncertainties about climate change had settled into the editorial policy. Other contemporary observers and insiders of the ABC testify that in the late 1990s and early 2000s, self-censorship and timidity marked the public broadcaster *vis a vis* federal government narratives on controversial issues (Manne, (Ed) 2005). My own informal monitoring (as a professional journalist) of ABC daily radio or tv news broadcasts in recent years, indicates that press gallery/politician perspectives predominate. The fact that we equate public media with a more incisive,

"truth-telling" stance thus appears optimistic, but is sometimes realised in the remnants of investigative journalism found with ABC *Four Corners* and in some Radio National documentaries.

The situation was different in the early study period. Former ABC broadcast producer Richard Smith recalled that he and journalist Geoff Burchfield produced a half-hour thematic special on climate change for the science program *Quantum* in 1988 and that the special came about because the science reporters and producers decided to "force the issue" and sold the program to management. Asked what triggered their interest, he said not only was the science of climate change "common knowledge" at the time, the specific trigger for the documentary special was the scientific work coming out of the CSIRO by Pearman and others around the time of the first Greenhouse conference in 1987. A four-part series followed with *Question of Survival*. However, by the early 1990s, management had changed within the science unit. Whether it was pressure from above, a perceived backlash, or personal preference, Smith did not know. But he said the new manager said people were not interested in environmental issues and declined further programs along these lines (R. Smith, thesis interview, June, 2007).

CULTURE WARS: AGENDA-SETTING AND IDEOLOGY

The term "culture wars" is frequently applied in social studies to describe a media agenda that seeks to influence the dominant ideas and values driving a society. Carvalho (2007) looked specifically at publishers' ideological input to climate change newspaper discourses and found that, internationally, this influence is significant. Carvalho reaffirmed what has been found by other media researchers and also the current study: that selection of story and information sources, frequency and quantity of space dedicated to "experts" and commentary, all can reflect a newspaper's ideological intentions and preferences.

A potent case study of agenda-setting with an ideological mission within the mainstream media (examined particularly by former *Sydney Morning Herald* and ABC journalist, and now unversity media researcher, David McKnight, and La Trobe University political scientist Robert Manne) is the free-market perspective on national and world events of Rupert Murdoch's transnational News Limited publications in Australia. In terms of the climate change story this has been reflected in *The Australian*,

the influential national newspaper, through a stance of uncertainty and doubt regarding climate change science and any attempts at regulated response that would affect commercial activity (Manne, 2011). *The Australian's* world view was in congruence with the increasing hegemony of economic rationalism as explored in chapters 5 and 6. A newspaper can reflect its perspective in editorials, opinion pieces, headlines, and story slant. In the case of *the Australian* and its "culture war" McKnight writes:

> This orthodoxy is one which holds to certain doctrinaire ideals about economic management, national identity, foreign affairs, public schools, climate change and many other issues.
>
> (and)
>
> It is an orthodoxy which is shared by a number of senior journalists at News Ltd and by many of their editorial writers, columnists and contributors. It is an intellectual universe in which a network of conservative think tanks, academics and writers of the right have a symbiotic relationship with the newspapers of News Ltd…and most significantly the coalition government under John Howard (McKnight, 2005, p. 54).

Considering that News Limited is said to control 70% of the mainstream press in Australia (Manne, 2005, p. 2), this is significant to communicators and the public discourse, particularly on issues such as climate change that might interfere with "business as usual" or call for regulation of business practices.

McKeown (2009) produced a thorough analysis of News Limited publications in Australia and their favourable coverage, throughout this dominant media empire, of geologist Ian Plimer's 2009 contrarian book on climate science. She speculated that this might have had a significant effect on the concurrent political discussion of an emission trading scheme. She also documented that a trend to release sceptical science books at key political time points has been an ongoing tactic of free-market think tanks that question climate change, particularly the IPA and the Lavoisier Group, amplified by sympathetic media outlets. Four such books were reportedly published in 2009, including Plimer's.

When media editorial policy agrees with business and policy objectives on an issue like climate change, it is often a congruence of cultural or ideological values amongst these sectors of society. The question of *who* first marks the agenda—whether media or policymakers—may be difficult to unravel: in the climate change case it may well have fallen into place through personalities and ideological agreement. But at least one veteran newsman and long-time ABC professional, Quentin Dempster, sees the lack of diversity and the concentration of media power in Australia as a sign of media corporations' power *over* the politicians, who have allowed them to develop strangleholds on the nation's sources of mainstream information. He writes: "… we must remind ourselves that Rupert Murdoch (News Limited) and Kerry Packer (Consolidated Press and TV channels) are not called 'the gatekeepers' for nothing. They have had a testicular hold on our prime ministers from Fraser to Howard," (Dempster, 2005, p. 113).

To digress briefly, overseas influence lies not just with global media companies such as News Limited. Transnational corporations in general have exerted major influence on Australian climate policy during the 1990s—aluminium smelting, coal, and metals corporations topping the list (Pearse, 2005). Further, Carey[52] has documented the strong influence of US public relations techniques and the agenda-setting role of free market think tanks since the 1970s on cultural institutions including on the media. Free market ideology was already a hallmark of the News Limited media along with a mission to convert the public to its cultural point of view when climate change came along as an issue (Carey, 1987).

According to many media workers who contributed to Manne (2005), Rupert Murdoch's News Limited and its "culture war" did exert considerable influence in Australia during the study period, beginning with concentrated ownership of Australian print media, including major mastheads in most capital cities and the country's only national newspaper: *The Australian, Sydney Telegraph, Melbourne Herald Sun, Brisbane Courier Mail* and *Adelaide Advertiser.* Manne (2005, 2011) documents how this near monopoly advantage, in combination with political attacks on the ABC (and

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[52] The late Alex Carey who researched psychology and industrial relations at the University of Sydney wrote extensively about the agenda-setting role of conservative think tanks that gained prominence in the past 30 years largely outside academia, and the lessons they learned from propaganda studies—documented in his seminal book *Taking the Risk out of Democracy: corporate propaganda versus freedom and democracy* (Carey, 1987).

the broadcaster's timidity in response) plus an aggressive right-wing commentariat assembled on News Limited pages have had profound impacts on Australian political culture. Manne makes the case that this has included a significant influence on public understanding and discourse of anthropogenic climate change.

McKnight gives examples of the transparent and undisguised ideological bent of some News Limited editors and writers (in a profession that cloaks itself in supposed neutrality and impartiality). He writes of editor Leslie Hollings who had open ties to the free-market Institute for Public Affairs (IPA) in the 1980s: "For a decade Hollings was a key figure in fashioning the ideological stance of *The Australian* and News Ltd," (p. 61), including championing economic rationalist goals like deregulation. In these ways "news" can be manufactured as a cultural construct.

Regarding other Australian print media, Rundle (2005) noted the journalistic "decline" of Fairfax corporation, which owns the *Sydney Morning Herald* and the *Australian Financial Review* (both sources for this thesis' media analysis over the study period) under the influence of a conservative board led by free-market competition policy advocate Fred Hilmer and prominent conservative businessman (sports, mining, casinos) Ron Walker in the mid-1990s. Rundle characterised the decline as a shift from being a liberal pluralistic publisher to one more closely aligned with the economic rationalist worldview that became hegemonic in the course of the 1990s. This provides some context to the change in story focus and the "balancing" of stories sampled in the later study period.

Rhetorical Devices that Support Culture Wars

Carey shed light on the convergence of ideology and rhetoric in the service of culture wars, compatible with propaganda studies that advise "us and them" framing.

> William Simon, secretary of the US Treasury 1973–77 [and formerly a bond trader on Wall Street] was one of the leaders of the campaign to reshape the political agenda that has led to the dominance of the neo-conservative movement in the USA. He claimed that the Jimmy Carter Administration was becoming collectivist, that the regulatory agencies of an "economic police state" were spreading "terror" among the corporations, and that the crisis of American

> democracy was due to the pervasive influence of "un-American intellectuals." (Carey, 1987, p. 167)

The use of similar "us and them" rhetoric is one framing device borrowed from propaganda that has been applied by columnists and radio talk show hosts to decry climate change science and those who believe climate change is an urgent risk to society. "Us and them" rhetoric, which was gaining strength during the later study period, can be illustrated from a 2009 piece by columnist Christopher Pearson, a former speechwriter for Prime Minister John Howard. In "Sceptic Spells Doom for Alarmist Religion" in *The Australian* he accuses climate scientists and environmentalists of "religious" fanaticism and calls the IPCC findings pseudo-science led by "eco-fundamentalists" who hate the modern world and subscribe to "anti-human totalitarianism" (Pearson, 2009, cited by McKewon, 2009, p. 11). [53] "Us and them" rhetoric is not confined to any one sector or ideological perspective in society but I illustrate it from this perspective because of its contributing role in re-establishing the hegemony of status quo values from 1996 on.

Story Metaphors of Home, Hearth and National Interest

Opinion polls cited by Nichols and McChesney (2005) of conservative voters' beliefs in the face of contrary evidence caused these media analysts to conclude: "getting the story wrong matters" (p. 168). Getting the story wrong has been made easier by the journalistic convention of reporting issues as dramatic personal narratives, framing global issues such as anthropogenic climate change in metaphors of personal loss or gain. As part of the analysis of rhetorical framing during the study period, I have shown that the dominant narrative by federal politicians and the media in the late 1990s held that action on climate change was a threat to jobs, and an attack by "them" (in Europe or the United Nations) on "our national interest" (read "family").

In this worldview market capitalism is synonymous with political democracy and "freedom", and there is a natural order in the type of economy Australia operates—e.g., the emphasis on export of natural resources (Hamilton, 2000). Thus "freedom" evokes a

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[53] Media critic Guy Rundle discusses the ideological perspective of Pearson and fellow Catholic commentator Frank Devine, who call environmentalism the "new paganism" (Rundle, 2005, p. 43).

metaphorical pathway that signals choice and lack of regulation; "national interest" signals growth in wealth through mineral extraction—coal being most relevant here. These value metaphors gloss over the reality that co-driving Australia's resource extraction policies are multinational corporations with their own interests, both on the ground and in the media.

How these rhetorical devices are applied in public discourse and the media/political "culture war" is further illustrated in a 2003 book by David Flint, *Twilight of the Elites.* Flint enjoyed a power position in regard to the Australian consumer and the Australian media as former chair of the Australian Competition and Consumer Commission (ACCC) and of the Australian Press Council during the study period. His book candidly sketches and approves of a campaign by the right against the left wing of Australian politics. Australian "sovereignty" and "prosperity" are dominant themes in this worldview as is a rhetorical attack on "Australia's media and legal elites" representing those who disagree. Labelling opponents elites (as opposed to the rest of us) has been another common rhetorical tactic. He writes: "A significant feature of the elite agenda involves the surrender of part of our sovereignty to international organisations" (Flint, 2003, p. 154).

Anti-United Nations sentiment helps explain why the IPCC gains no respect from people holding this worldview. In regard to the Kyoto Protocol, Flint writes "The Kyoto Protocol is obviously another elite passion" (p. 175) and proceeds to quote the Lavoisier Group, and professional academic sceptics Fred Singer, Ian Castles and others on climate change—as well Brian Fisher of ABARE, whose economic modelling underpinned much of the argument about the potential severe damage to the Australian economy if Australia signed any significant Kyoto targets.

THE INFLUENCE OF PUBLIC RELATIONS AND RADIO

Beder, (2000), Carey, (1997) and Delwiche, (1995) have shown how propaganda techniques are successfully applied to much of what we understand today as public relations and marketing techniques.

Common propaganda techniques that can be recognised in the metaphors and rhetoric I have identified include the use of fear, name calling, glittering generalities, euphemisms

(metaphorical language or misleading labels), and appeals to what the Americans call "plain folks" and Australians would call "the battlers". An extension of these techniques can be seen in the public relations advice on how to frame climate change science to stress uncertainty offered by Frank Luntz (2003), discussed previously. Scientists for example can and were called just another "academic elite", out to keep their jobs and their perks.

Ward looked at the influence of public relations techniques in setting the dominant narrative and news agenda. He found that the literature on public relations sheds no light on these questions. He says both practitioners and critics have not evaluated, or critically examined, the methods. In 2001 he concluded: "the first step … must be to examine how it is that practitioners of public relations have managed to usurp authorship of the news" (Ward, 2001, p. 178).

Public relations is matched by talk back radio in its power to influence audiences. Radio professional John Faine argues that a major strategic advantage for the John Howard federal Coalition view of the world from the mid 1990s was the understanding of the importance of talkback radio. "Talk radio has overtaken all of the forms of media—electronic or print—as a political medium in Australia. It has become the daily agenda setter and the preferred organ for national and state leaders to sell policies and ideas," (Faine, 2005, p.167). Consequently, the radio talkback hosts, along with the politicians they interview, wield relatively immense power in setting the daily issue agenda for public discourse.

My analyses did not further explore either the influence of public relations or interactive radio but there is little doubt that both are powerful agenda-setting tools wielding the means for sowing either certainty or confusion in audiences and therefore worth noting for communication analysis of the climate change story.

CONCLUSION

Referring to the 1990s and early 2000s, then Labor political adviser and self-styled "left" media commentator Dennis Glover (2005) observes how ideological hegemony was forged in Australia during the late 1990s with influential media allies:

> (Prime Minister) John Howard had the powerful levers of government at his disposal to influence public opinion, but he had something more—a strong forward pack of media supporters willing to pick up a policy or a message, and smash through the opposing teams defences … the screaming front page "exclusives", rabid opinion columns, unbalanced editorials, soft radio interviews and opponents made timid by their own ethical codes, must be close to what the Italian political theorist Antonio Gramsci had in mind when he coined the term "hegemony." (p. 213)

This ideological hegemony succeeded in obscuring earlier knowledge of what James Baker, former Head of the US National Oceanic and Atmospheric Administration NOAA) said of climate change science in 1997, "There's no better scientific consensus on any other issue I know—except perhaps Newton's second law of dynamics" (Gelbspan 2005, p.73). Much media coverage during the second half of the study period nevertheless treated the scientific message about human involvement in climate change as debatable and dismissed arguments for prompt action. The media's ability to do this is described as agenda setting, and it is done *together with* policy-makers with similar values. Structural factors in the media also influence the dominant narrative that emerges from the agenda-setting.

An influential structural factor in Australia is the increasing concentration and lack of diversity of the Australian print and broadcast media in an increasingly global media business environment that has severely eroded journalism's traditional role as a watchdog of the public interest. Some scholars dispute the pre-eminence of this role arguing that evolution of mass communication during the past century has always been about telling selective stories and narratives that frame how people should think about matters in society. Another structural influence is that media owners and editors view society primarily through a political and economic lens which came to dominate the public communication of climate change in the 1990s.

This thesis proposes that the co-agenda setting role of the mass media with policy-makers led to an early clear public understanding of the science messages on anthropogenic climate change when scientists, media and politicians agreed on the risk messages and possible remedies. Later the media became instrumental in a political reframe of the public knowledge and creation of a different narrative—despite the basic science messages of public risk remaining consistent from beginning to end of the study period.

Three structural features of contemporary news gathering and placement were examined with examples from the newspaper evidence sampled for this thesis. These features were (a) the convention of relying on official sources, particularly politicians, to validate that a story is a story; (b) the use, misuse and omission of context in news reporting and, (c) manufactured "balance" with sceptic perspectives in climate change stories or across extended coverage. The evidence shows that from the mid 1990s opinion pieces agreeing and disagreeing with the mainstream scientific assessment became more dominant. Together with sceptic contributors and columnists, and editorial attempts to create a scientific "balance" this trend arguably fostered audience confusion and uncertainty about scientific understanding and the sense that "scientists don't agree".

The structural dominance of political reporting is also analysed as press gallery journalists framed the story mostly in terms of international negotiations and as a drama between the federal government and green groups who were increasingly portrayed as being against business and jobs. A similar dramatic narrative pitched the federal government against outsiders, the UN or Europeans, who did not understand Australia and its special needs. The corporate energy sector and its priorities were framed as the mainstream.

The influential role of News Limited (the so-called Murdoch press) is briefly examined because News Limited owns 70% of Australian print media, has demonstrated a willingness to wage a "cultural war" congruent with the economic rationalist worldview and has taken a sceptical editorial stance to climate change science and response for the study period and beyond. The role in changing climate change communication of the internet, public relations methods, talk back radio and audience fragmentation are other themes of interest that would reward further study.

The meta issue that arises from the exploration of the intersect of science, media, and policy is to question the nature of perceived "reality" to which the public reacts on a daily basis. Both the literature and the evidence gathered for this thesis indicate that perceived reality can be, and is, framed and changed by elite agenda setters within societies. The media and politicians are the main frontline actors who set the agenda. With the understanding of the influence exerted by beliefs and values outlined in the previous chapter, not least changing economic ideology, this exploration agrees with the analysis of Ward. He concluded that contrary to the positivist view that there is one "real" world that is the source of "facts" that can be reported: "journalists do not … report what really happens. Inevitably, the news media report society and politics selectively, not in the way the gatekeeper model suggests, but by drawing upon and assuming a culturally specific understanding of society and politics" (Ward, 2001, p. 123).

In the next chapter I look at what emerged as the third major influence on the climate change discourses of the 1990s—scientists own views and language, which suggests a different perspective on at least some public scepticism.

CHAPTER EIGHT:

FRAMING THE DOMINANT NARRATIVE—INFLUENCES III, SCIENTISTS' WORLD VIEWS, EPISTEMOLOGIES AND PUBLIC SCEPTICISM

"Sceptics – look at their track record; for an important group of sceptics their primary qualification is geology; in this argument, that offers red herrings and doesn't help the policy process"

Geoff Love, Director, (Australian) Bureau of Meteorology, speaking at the 2007 5th World Conference of Science Journalists Melbourne, 18 April, 2007.

"Climate scientists are a very small cabal that actually don't study climate change, they study weather change...but the expert group of scientists on climate change...is the people you've just referred to, geologists."

Bob Carter, marine geologist, speaking on 6PR, Perth, *Mornings with Paul Murray*, 11 March , 2011; quoted on *ABC Mediawatch,* 21 March, 2011.

INTRODUCTION

Scientists too have values and beliefs. Various authors have pointed out that the different world views of different scientific disciplines can be and are significant in their input to science and society discourses.

Becher (1994) specialised in assessing the impact of what he called the "widely neglected" field of disciplinary differences in higher education and their wider effects. While focusing on the academic environment, he points out that disciplinary groups can be seen as academic tribes with their own set of intellectual values and their own patch of cognitive territory. This sets the scene for a better understanding of the challenges faced by the sprawling, multi-disciplinary task of unravelling climate change and also some understanding of where some of the staunchest sceptics have come from. Climate science has required that scientists from a wide range of earth and environmental sciences learn to cooperate, and to accept each others' data, often for the first time, to affect the progress that has been made.

Sarewitz (2004) proposed that competing disciplinary approaches to the scientific basis of an environmental controversy may be linked to competing value-based positions. In

a paper on environmental science and policy, looking at the interaction of disciplinary differences with social values and "normative lenses" (i.e. what a discipline considers *should* be the case) Sarewitz (2004) notes that the researcher is confronted with:

> a well-known empirical problem … In areas as diverse as climate change, nuclear waste disposal, endangered species and biodiversity [lists other environmental research areas]...and agricultural biotechnology, the growth of considerable bodies of scientific knowledge, created especially to resolve political dispute and for effective decision-making, has often been accompanied instead by growing political controversy and gridlock. Science typically lies at the centre of the debate, where those who advocate some line of action are likely to claim a scientific justification for their position, while those opposing the action will either invoke scientific uncertainty or competing scientific results to support their opposition. (p. 386)

The basic understanding of the body of research he quotes (principally works by Jasanoff and Wynne in the 1990s and Nelkin in the 1970s) is that science is co-produced by scientists and the society in which they are embedded—an understanding also at the core of the present study. This literature also shows that the boundaries between science and policy are frequently renegotiated, which the current study also supports. Sarewitz concludes that scientific uncertainty is a symptom not of lack of evidence but of lack of coherence between competing scientific understandings. The current study supports that proposition and offers as an illustration a closer look at the tenets of several disciplines that have been at the forefront of sceptical debate about anthropogenic climate change.

DISCIPLINARY BACKGROUNDS AND SCEPTICAL DEBATE

In Australia, whether or not one calls economics a science, its normative assumptions and theories have exerted a huge influence on the public discourse and on political attitudes towards climate science during the study period, as I suggest in chapter 6. In regard to other disciplines prominent in the public discourse, many of Australia's most oft-quoted climate change sceptics with seemingly relevant scientific credentials are either geologists — for example Bob Carter (James Cook University), Ian Plimer

(University of Adelaide and mining company director)—or meteorologists William Kininmonth, (former administrator of the Bureau of Meteorology's National Climate Centre), and for a while, Brian Tucker (after leaving CSIRO Atmospheric Research).[54]

The term "sceptics" is commonly used to denote those who reject the IPCC findings on anthropogenic climate change or deny human agency in the phenomenon. Other labels are "denier" and "contrarian". In this thesis I use the term "sceptic" as defined above, with the acknowledgement that this use is problematical in scientific circles because a majority of scientists would characterise themselves as sceptical by training and inclination.

Spencer Weart, a science historian and Director of the Centre for History of Physics at the American Institute of Physics, drew on hundreds of interviews as he charted the history of how scientists slowly came to understand climate change, its relation to human activities and that significant changes (heating, freezing, flooding etc) could happen more rapidly than scientists had thought possible a decade previously (Weart, 2003). The scientists' task from the mid 20th century was to isolate the chief influences and effects, delineate the scope and rapidity of likely changes and, by the 1980s, give voice to a growing urgency that we have a problem and convince policy-makers and the public. This has not always been an easy cooperative venture.

The influence of disciplinary differences, uncovered by Weart, helps explain the perspective and tenacity of some scientific sceptics who are not necessarily linked to corporate special interests and whose continuing public debate in the face of overwhelming evidence may appear puzzling. The history of disciplinary differences is thus relevant to climate change communication over time. While the general public and many journalists may think that anyone called a climatologist or a meteorologist or geologist must be an expert on climate change, and some may be, the disciplinary assumptions of these professions, particularly from training dating back 30–50 years,

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[54] Two of the leading 1990s US sceptics invited to Australia during the study period, Patrick Michaels and Robert Balling, were climatologists by training or employment (*Sourcewatch*). Displaying their own disciplinary perspectives, economists and statisticians like Ian Castle and Bjorn Lomborg have entered the debate with a sceptical point of view. Hamilton in his book *Scorcher* also discusses the Australian sceptics, as does the website *Sourcewatch* which provides backgrounds on prominent sceptics. Tucker is an interesting case. The former head of CSIRO Atmospheric Research on retiring became an adviser to the sceptical Institute for Public Affairs, noted in this chapter.

may be quite different from that of today's specialised atmospheric and climate scientists. Biological scientist Peter Doherty (2009) says as much in a recent essay on the complexity of modern interdisciplinary science which collates a huge amount of interrelated data from various disciplines. Referring readers to the website of the Geological Society of America for an updated scientific view regarding climate science he notes: "A few old geology and meteorology practitioners, in particular, are very uncomfortable with this process and over-state the case that their 'historical knowledge' is being ignored" (Doherty, 2009, p. 9).

Weart shows how geologists, climatologists and meteorologists come from disciplinary backgrounds grounded in beliefs that past or present conditions are the only valid predictors of weather, climate or future planetary situations. In this view, modelling data of an uncharted future can always be attacked as weak and unsubstantiated. These disciplinary backgrounds also would incline the practitioners to promote a natural variation explanation and reject the anthropogenic component of climate change phenomena.

"Balance of Nature" and Other Beliefs

In a previous chapter I considered the influence of beliefs—whether economic, religious or "techno fix"—on the climate change discourse. In regard to anthropogenic influence, the concept of belief appears relevant in disciplinary terms as well.

Weart notes that, until very recently, there was an implicit belief among those studying earth processes, that there is a "balance of nature" that would correct any disturbances created by human activity. Indeed, that human activity is insignificant against the great planetary forces that shape and reshape our world. Calculations made since the late 1800s by Arrhenius and others about the heat-holding significance of a rise in CO_2 levels in the atmosphere drew arguments that there are compensating or balancing mechanisms such as increased cloud formation:

> These objections conformed to a view of the natural world that was so widespread that most people thought of it as plain common sense. In this view the way cloudiness rose or fell to stabilize temperature, or the way oceans maintained a fixed level of gases in the atmosphere were examples of a universal

> principle: the Balance of Nature. Hardly anyone imagined that human actions, so puny among the vast natural powers, could upset the balance that governed the planet as a whole....This view of nature —suprahuman, benevolent and inherently stable — lay deep in most human cultures. It was traditionally tied up with a religious faith in the God-given order of the universe. (Weart, 2003, pp. 8-9)[55]

While by the mid 20th century everyone also knew that there could be pivotal global changes such as ice ages—in fact the exploration of ice ages formed the genesis of climate change studies—the assumption was that this only happened on vast timescales, not on human time scales, so it was believed there was no immediate worry about any potential climatic changes. Geologists were at the forefront of mapping out the ice ages, which brought them into climate studies, and their basic disciplinary assumptions conformed to the so-called "uniformitarian principle"—that the present is always representative of the past. Ian Plimer, for example, was listed on the neo-liberal Institute for Public Affairs website in 2007 with a review article entitled *The Past is the Key to the Present: Greenhouse and Icehouse over Time* (Plimer, 2007). Writes Weart:

> This [uniformitarian] principle held that the forces that molded ice, rock, sea and air did not vary over time, or, as some put it, nothing could change otherwise than the way things were seen to change in the present. The principle was cherished by geologists as the very foundation of their science, for how could you study anything scientifically unless the rules stayed the same? (Weart 2003, pp. 9-10)

Weart and also science historian Naomi Oreskes describe the fascinating background to this belief. According to these researchers, it came from a painful, disputative disengagement among geologists from "catastrophist" theories of global change rooted in religious traditions such as Noah's flood. Given this history, geologists were not about to entertain new theories of rapid, catastrophic change without a battle. At the

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[55] Lynn White Jr's 1960s seminal study *The Historical Roots of our Ecological Crisis* set the stage for environmental history studies that acknowledged the ingrained Christian beliefs in western culture about the roles of God, humans and nature.

same time, many scientists, like other members of society, privately retained a view that the world was governed by a "normal" God-given order.[56]

Normality and Consistency Frames in Climatology and Meteorology

Beliefs in normality and consistency pervaded the related fields of climatology and meteorology. If one thinks about how the weather is still reported, even in a country as manifestly variable as Australia, it is in deviations from some hypothetical or statistical norm.

Weart writes that the science of climatology has traditionally informed the exercise of averaging seasonal temperatures and rainfall and has been based on the belief that statistics of the past 100 years, since records began, could reliably predict future decades and that "climate" equalled a set of weather data averaged over the ups and downs. Principal clients were farmers and engineers who needed statistics to decide on crop plantings and 100 year floods. While climatologists predicted seasons, meteorologists were using similar means to look at the next day's weather by looking at the recent past.

Thus, all three of these disciplines had developed a culture of relatively narrow, quantitative empiricism that viewed modelling and theorising outside the box as problematic territory. Meteorologist Brian Tucker, former Chief of the CSIRO Division of Atmospheric Research, provided scientific analyses for the sceptical Institute for Public Affairs as a Senior Research Fellow from the mid 1990s, emphasising uncertainty and caution. In a letter to this thesis project following a 2006 interview he wrote: "although perceptions of possible climate change depend almost entirely on numerical climate modelling, model results are generally accepted uncritically, with little cognizance given to the weaknesses inherent in model specifications, the mathematics used and the poor precision of model results."[57]

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[56] Oreskes, in a detailed analysis of the geological disputes over continental drift, writes that uniformitarianism was the geologists' answer to dealing with the problem of inductive (field) evidence and from the "eighteenth century association, particularly in England, of geology with theology in general and with scriptural exegesis in particular". Given this background,, sudden or dramatic change, "unaccounted for by the normal processes of daily geological life were all too close to miracles for most geologists'comfort" (Oreskes, 1999, p. 204).

[57] Tucker and other sceptical scientists who involved themselves in the science and policy debate over climate change do not appear as ready to apply the same criticisms to economic modelling and its

In Australia, the influence of this epistemology can be seen also in the relative absence of the Bureau of Meteorology (BOM) from the evidence I found of public discourse in Australia during the 1990s and the eventual emergence of a top BOM scientific administrator, Bill Kininmonth, as a prominent sceptic following his retirement. John Zillman, Director of BOM from 1978 to 2003 was engaged with climate science policy advice to government but the record indicates this was mainly confined to acting through the processes of the World Meteorological Organisation and the Intergovernmental Panel on Climate Change (IPCC). His perspective can perhaps be gauged from how he communicates, with an example. His cautious public stance may reflect the ambivalence of climatologists and meteorologists when faced with reconciling evidence on the ground and modelling data. He was described as "quite conservative" about climate science in a detailed 2004 article on the Australian sceptics and the Lavoisier Group (Fyfe, 2004). The article quotes him as saying he is now convinced of the mainstream science of climate change and human agency, although he would not have been "10 years ago"—i.e. in the mid 1990s.

Zillman discussed his views in the internal journal of the Australian Academy of Technological Sciences and Engineering (ATSE). According to Beder (1989) engineers and their technological colleagues also enjoy a subculture and related technocratic world views. This manifests as caution and a preference for the conventional role of scientists removed from the communication role to the general public. In 2006, Zillman wrote in an ATSE focus article that "very strident statements" by the climate scientists and policy-makers who met at the pivotal meeting in Villach, Austria in 1985 (and advised the world that governments needed to act) necessitated the formation of the (IPCC) through the World Meteorological Organisation and the United Nations to provide a balanced review of the extant data. He also wrote that the media can violently misrepresent the IPCC's findings and credibility. The scientists' role is to avoid even subtle misrepresentations of their findings—presumably by avoiding public interpretation wherever possible (Zillman, 2006).

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inherent, normative assumptions. Thus, in a critical piece written for the Institute for Public Affairs (IPA) Tucker quoted at length from an economic analysis produced for the Electricity Supply Association of Australia in August 1994. This analysis predicted 50 and 60 percent increases in energy prices and the elimination of the aluminium industry if the 1990 interim national emission reduction target of a return to 1988 levels by the year 2000 and further reductions went ahead. While this economic modelling was accepted at face value, Tucker's view was that climate science based on modelling was uncertain, and in any case any impacts would occur slowly over centuries and that the policy response verged on panic—much in line with Weart's disciplinary descriptions (Tucker, 1994).

Scepticism about Human Agency Consistent with Disciplinary Beliefs

Zillman's former colleague Bill Kininmonth became active after his retirement in 1998 promoting the view that climate change is a purely natural variation that takes place over long time spans and that human impact is minimal. This is consistent with the understanding for some climatologists, meteorologists and geologists that past cycles always inform the present. Kininmonth told ABC science program *Catalyst* in 2005 that:

> the science underpinning the greenhouse scenario is flawed. The computer models are at a rudimentary state of development. The actual science of climate would suggest that we are near the peak of global warming and that the prospect is in fact, in the longer term we're talking now thousands, to tens of thousand of years, is a gradual cooling. (Horstman, 2005)

On the same program, atmospheric scientist Graeme Pearman, who has communicated risk messages to the public since the 1980s retorted: "I think it's rubbish. I think he's not an expert, he hasn't tested his ideas in the open literature, that's what scientists have to do" (Horstman, 2005).

Like other sceptics in retirement from active science, Kininmonth has "found fame in the twilight of his career", according to Fyfe (2004), who noted he has been promoted by the climate-science antagonist Lavoisier Group in Australia. He was named as a Science Adviser, along with Australian geologist Bob Carter, at the US Science and Public Policy Institute. British professional sceptic (Lord) Christopher Monckton has been the Chief Policy Adviser for this neo-liberal think tank dedicated to "sound science including climate scepticism" (*Science and public policy institute, about*). [58]

Emeritus Professor Garth Paltridge is one of the few atmospheric physicists active on the Australian sceptic scene. He had been based in Tasmania as the Director of the Institute of Antarctic and Southern Ocean Studies until his retirement in 2002. His

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[58]When Kininmonth's book denying anthropogenic climate change was launched by the Lavoisier Group in 2004, Zillman agreed to launch it and then gave a remarkable speech supporting freedom of debate but criticising Kininmonth's assistance to those who denied the anthropogenic influence when the preponderance of the evidence now pointed to it (Zillman, 2004).

emeritus age demographic is common amongst Australian public sceptics. He advances a frequent complaint made by these critics—rejecting the science popularisation and policy dual role of the IPCC:

> Revamped IPCC scientific reports have appeared with much fanfare every few years since 1991. Each of them is accompanied by a "Summary for Policy Makers" which is the only thing read by 99.9 per cent of those concerned with the matter. It is the real determinant of public and political opinion on the greenhouse issue. It is also that part of the report whose wording is more-or-less beyond the direct influence of the average scientist.
>
> Each of the successive summaries has been phrased in such a way as to appear a little more certain than the last that greenhouse warming is a potential disaster for mankind. The increasing verbal certainty does not derive from any advances in the science. Rather, it is a function of how strongly a statement about global warming can be put without inviting a significant backlash from the general scientific community. Over the years, the opinion of that community has been manipulated into more-or-less passive support by a deliberate campaign to isolate - and indeed to denigrate - the scientific sceptics outside the central activity of the IPCC. The audience has been actively conditioned into being receptive. It has thereby become gradually easier to sell the proposition of greenhouse disaster. (Paltridge, 2004, p.14)

Like other commentators on various sides of this issue, Paltridge overlooks or does not acknowledge the early communication framing: the strong and direct language of the first, 1990, IPCC report. He thereby makes a case that is not based on all the available evidence.

ATTACKS ON ENVIRONMENTAL SCIENCE AND TARGETED SCEPTICISM

While it is argued that disciplinary differences have pre-disposed some scientists to a sceptical and debating stance in the public discourse on climate change, the evidence shows there has also been a more targeted attack on climate science, and environmental science generally, coming from certain political and corporate interests during the period of interest of this study. Some of these attacks have publicly involved sceptical

scientists. At the same time, in the US in particular, there is evidence of political interference and political attacks on scientists and their data, see Box 1, hockey stick case in chapter 2, for a prominent example.

In March 2004 the US Union of Concerned Scientists (UCS) published an "open letter" called *Scientific Integrity in Policymaking* signed by 62 prominent scientists, including Nobel laureates, and heads of federal agencies and universities (*Union of Concerned Scientists*, 2004). According to the UCS website, around that time another 5000 scientists signed a similar statement (by 2010, 12,000 scientists are said to have signed this document). The letter said that the Bush administration in the US (2001—2009) encouraged systematic interference and misrepresentation of findings, including those on climate change, and that this compromised the integrity of science communication. The letter spoke of "consistent misrepresentation of the findings from the National Academy of Sciences, government agencies and the expert community at large". The UCS also asserted this misrepresentation was accompanied by "disreputable and fringe science reports and [by] preventing informed discussion on the issue" (*Union of Concerned Scientists*, 2004).

A 2007 survey of working government scientists in the US supported these findings with personal testimony.[59] There are documented complaints about government reports being shelved, conclusions being altered or deleted, political operatives second-guessing scientists and cases of scientists being harassed by Congressional committees. The survey found that more than 40% of respondents reported pressure to eliminate words like "climate change" and edit reports to change their meaning. Other practices found in this US survey included: not issuing press releases, changing press releases by injecting uncertainty or making communication so bland or technical that nobody would give it a second glance. (*Atmosphere of Pressure*, 2007)

There is not a similar body of evidence of this level of interference in Australia. But a dampening effect on communication can be assumed given charges of government scientists being "muzzled"' from 1996 when the Coalition came to power federally (Cohen, 2006; Pockley, 2006; Hamilton & Maddison, 2007) and given the closely allied

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[59] *Atmosphere of Pressure: Political Interference in Federal Climate Science* report was published by two non-government agencies: the Government Accountability Project (GAP) and Union of Concerned Scientists (USC). The UCS and GAP surveyed almost 300 scientists, carried out 40 interviews and searched thousands of agency documents (*Atmosphere of Pressure*, 2007).

political and economic views of Australia and the US through the latter part of the 1990s and early 2000s. Thus a prominent science communicator from the 1990s described what the Howard Coalition government signalled to public science agencies: "Scientists were told you don't say anything that might embarrass the government or the minister." He said control was also exercised through the increasing emphasis on commercialisation within the CSIRO and a de-emphasis through budget cuts on public interest science agencies such as Atmospheric Research and Wildlife and Ecology. "These divisions were the target for political pressure during the 10 years of the Coalition…. with the extraordinary notion that scientists have nothing to do with policy in these areas of climate and natural resources" (thesis interview, June, 2006).

The larger context is the considerable body of documentation, largely outside the academic journals, about what some call a "war" on environmental science that started in the United States during the 1970s and, coinciding with the 30 year neo-liberal experiment started under President Ronald Reagan in the US, which gained traction in Australia during this period (Ehrlich, 1998; Beder, 2000; Mooney, 2005). The neo-liberal perspective on environment is related to the value structures and beliefs outlined under "war of ideas" in chapter 6. [60]

Links between Sceptic Books and Neo-Liberal Think Tanks

Some sceptic scientists with epistemological grounds for questioning the climate research methods, have joined, or been recruited by, neo-liberal think tanks such as the IPA or the Lavoisier Group in Australia and others in the US. Neo-liberal criticism of climate change science is consistent with the ideology's coolness towards environmentalism and antipathy to public interest science and policy generally, consistent with the market and private sector fundamentalism that marks this economic philosophy (Beder, 2000; Mooney, 2005).

In 2008, a trio of US social and political scientists published a study that quantified the links between scientific climate change sceptics and neo-liberal think tanks (Jacques, Dunlap & Freeman, 2008). Given the background we have just looked at, in most cases there is no evidence to believe that, for the scientists involved, links to think tanks have

[60] Before anthropogenic climate change became a debate, an earlier and similar science and society wrangle was the 10 year battle from the mid 1970s over accepting human responsibility for the hole in the ozone layer (I. Lowe, thesis interview, April 2007).

been anything but sincere outlets for their arguments or to stem the information deficit from their point of view. Other authors have argued that some scientists have been exploited and used as public relations voices or were cynically taking payment for their views (Beder, 2000; Rampton & Stauber, 2002; Mooney, 2005). Jacques et al. found that more than 92 percent of sceptical books published in the US were linked to conservative/neo-liberal think tanks and that 90 per cent of conservative think tanks interested in environmental issues take a sceptical stance to the evidence. Jacques et al. found that the framing by sceptics of themselves versus the science was often not neutral:

> Environmental scepticism is an elite-driven reaction to global environmentalism, organised by core actors within the conservative movement. Promoting scepticism is a key tactic of the anti-environmental counter movement coordinated by conservative think tanks (CTTs), designed specifically to undermine the environmental movement's efforts to legitimise its claims via science.
>
> Thus, the notion that environmental sceptics are unbiased analysts exposing the myths and scare tactics employed by those they label practitioners of 'junk science' lacks credibility. Similarly the self-portrayal of sceptics as marginalised 'Davids' battling the powerful 'Goliath' of environmentalists and environmental scientists is a charade, as sceptics are supported by politically powerful CTTs funded by wealthy foundations and corporations (Jacques et al., 2008, p. 364)

The evidence explored for this thesis supports the proposition that there is a close ideological affinity between free-market, neo-liberal North American (including Canadian) think tanks and those in Australia like the Institute for Public Affairs (IPA) which receives considerable funding from the resource sector (Beder, 2000; Pearse, 2007) and also the Lavoisier Group—the latter established specifically, under the lead of mining sector representatives, to counter climate change science (*About the Lavoisier Group*). The ideas from these think tanks have been amplified by media, particularly by the News Limited media led by *The Australian* as shown in the previous chapter. Rhetoric and frames on think tank-related websites and in newspaper columns have charged climate scientists with self-serving agendas and motives but with little or no corroborating evidence. The Brown Congressional enquiry reviewed later in this

chapter compiled a list of common frames and strategies. In an early 2000s Australian example, the editor of the *IPA Review* Mike Nahan editorialised in an article entitled "The Demise of Science":

> Why have so many scientists succumbed to being myth-makers? One answer is money. Shock and horror not only sells newspapers and generates donations for NGOs, it also generates funding for research. And as Professor Bob Carter discusses in "Science is Not Consensus" (pages 11-13) changes to the funding of science in recent years have increased the incentive for scientists to join in the doom and gloom. (Nahan, 2003)

Aids to Uncertainty and Inaction

New Scientist reported that the same techniques which arguably distorted the public discourse in Australia and the US during the 1990s were still operational in Britain in the 2000s, featuring familiar global mentors. In an editorial "Still in a mess over climate change" (2006), the science magazine echoed what some environmental groups and investigators have reported from the 1990s on (e.g. Greenpeace's Exxonsecrets at www.greenpeace.org); Mooney, 2005; Gelbspan, 2004; Beder, 2000) about the oil company Exxon Mobil's long-standing and extensive funding of lobby groups, think tanks and individuals that, the science magazine said, misinform the public on climate change.

New Scientist reported charges against Exxon Mobil stemmed from no less than the Royal Society in London which sent "a measured complaint" to the oil company about these practices, only to be ignored. *New Scientist* fumed that such arrogance towards one of the world's oldest scientific institutions "seems to rival their contempt for good science itself" (*Still in a mess*, 2006, p.5). *New Scientist* drew a picture of public discourse in Britain in the mid-2000s beset by familiar public relations and propaganda tactics of sowing confusion recognizable as the "big lie" or "name calling" techniques.

Evidence for the corporate strategy of using sceptical scientists to sow uncertainty into the public discourse surfaced in the Australian media in 2007 and involved Exxon Mobile. Following the release of the fourth IPCC assessment, the *Sydney Morning*

Herald revealed in a page one report that Exxon was offering $10,000 to scientists to dispute the IPCC findings (*Bribes for experts,* 2007).

Calling the global scientific consensus a "debate" has been one of the most familiar rhetorical framing devices of the past 10 years. A recognisable propaganda technique involves distortion or misuse of a commonly understood concept to engender negative emotional reactions in an audience. Decrying those who want to "shut down debate" or "politicise the science", or are said to merely seek self-advancement/research funding if they speak publicly, have been frequent examples. Lack of "sound science" has been another recognisable frame along with the one about misleading the public with "scaremongering". A review of public discourse and framing, particularly through the mass media, and even a cursory look at the blogosphere, leads to the conclusion that such negative labelling techniques are not confined to anti-climate science activists but have polluted public debate on a wide front, arguably leading to more public disengagement and confusion.

A Recipe for Confusion

In the mid-1990s a US Congressional Committee investigated charges of biased science, made by conservative members of Congress (Brown, 1996.) The resulting report—*Environmental Science under Siege, Fringe Science and the 104th Congress*—documented attacks against climate scientists and others working with environmental and public health regulations. The Congressmen who made the allegations and the sceptic scientists they called to testify alleged that environmental scientists couldn't be trusted. The Committee found there was no basis to this and made a useful summary of how science communication has been confused as a result of attempts to discredit the scientists.

They said strategies used by sceptical individuals and organisations included: abusing the goodwill of democratic and scientific practice by diverting time and attention to the views of a few dissenting scientists; launching sceptical attacks that consistently mix scientific data, opinion and policy advice while mainstream scientists do not have this luxury; dismissing or misusing scientific conventions including peer review, consensus and uncertainty. The committee identified a recipe for confused public discourse and inaction that can erode public trust in science. In the 10 years since, the discourse

indicates that not just climate scientists but aspects of science itself has arguably come under siege as a narrative of mistrust is elaborated—but this is beyond the scope of the present enquiry.

A year after the Brown report, a concerted attack on environmentalists and climate change science appeared on mainstream British TV on Ch4 and was repeated by the ABC in Australia in 1998. The 1997 two-hour *Against Nature* video program directed by Martin Durkin, made good use of a number of familiar media techniques including: opinions from alleged "expert" scientists without background context on who these people are and failing to mention the larger context or balance of evidence—the IPCC international scientific reviews.

One of the experts interviewed, Dr S. Fred Singer, a retired US space physicist and science administrator, has been characterised as a consultant/career sceptic who aided the battle to deny industrial responsibility for ozone depletion before moving on to anthropogenic climate change. As such he is a good example of a professional contrarian. He is one of the leading US sceptics who were invited to present their views on climate change in Australia during the mid to late 1990s, sponsored by conservative, free-market think tanks but also by the CSIRO (Beder, 1997). During the latter part of his career he did not publish his critiques in the peer-reviewed literature, a common hallmark of retired sceptics.

In the 1990s, Exxon Mobile supported Singer's policy research group and he first earned his "sceptic" tag by appearing as an expert for the tobacco industry in a contest that honed many of the public relations and communication strategies still used by corporations today. The tobacco campaign popularised the phrase "junk science" which subsequently has been used by both sides to discredit opposing views. The tobacco campaign also popularised the use of scientific experts rather than corporate spokespeople to make the industry's case (Rampton & Stauber, 2002; Beder, 1997).[61]

The UK's Independent Television Commission subsequently found that *Against Nature* was misleading and distorted interview information. Media enquiries at the time found

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[8] Singer was also a lead author of the highly criticised but effective Leibzig Declaration on Global Climate Change that showcased dissenting opinions (Beder, 1997, p.238).

that while the script echoed extreme conservative arguments against environmentalists, the program's director describes himself as a Marxist. The rhetoric was that of a small far-left group, the Revolutionary Communist Party, which also had links to several of the featured "experts". This group believes that sustainability or environmental concerns are conspiracies against progress for Third World people. (Monbiot, 1997). It seems the attacks on environmental science come into the public arena from various directions within western society.

A followup program called *The Great Global Warming Swindle* was made by the same director and UK Channel 4, yielding similar complaints about distortions and inaccuracies of the science, found to be valid complaints by the British broadcasting regulator (Cubby, 2008). In July 2008 the program was controversially shown on ABC television in Australia and received a large audience. The slick packaging, persuasive images and "experts" with science labels, led to anecdotal responses that this program successfully created public confusion or uncertainty.

British journalist George Monbiot was asked in 1997 after the first *Against Nature* program how ideas like the ones showcased in that program could receive a three hour prime time television slot. His analysis was that:

> Many television executives hate environmentalism. They see it as a grim *memento mori* at the bottom of the pictures, spoiling the good news about cars, clothes and consumerism. So when the film-makers suggested an all-out assault on environmentalists, their proposal fell on fertile ground. (Monbiot, 1997, p.1)

CONCLUSION

This exploration of disciplinary differences and climate change scepticism offers some reasons for why and how some disciplines appear to have spawned more sceptics than others. For geologists, meteorologists and climatologists it can be largely a matter of their training and a perspective on research that relies on the past always predicting the future. The unprecedented nature of human effects on the planet, would clearly have posed a novel challenge in these disciplines. This may be a generational phenomenon, less prevalent in newer ranks, but this thesis has not explored that aspect.

Sceptic scientists from these disciplines have played an important role in creating uncertainty in the Australian public discourse during the study period. Science history offers useful evidence as to why geologists, prominent amongst Australian sceptics, may be particularly prone to challenge the mainstream climate change scientific methods that rely on modelling future events. However, it is not only disciplinary differences that have influenced and confused the public understanding. This chapter shows how institutional support for sceptic voices can frame the discourse and I explore some of the techniques regularly employed to do so. Evidence from the United States adds the element of deliberate communication barriers being placed in the way of mainstream government climate scientists and, at a less overt level, this may have happened in Australia as well.

Surveying the tactics used by sceptic scientists in the public arena led to a revealing summary by a US Congressional Committee in the later study period of ways in which mainstream climate scientists have been at a disadvantage in public communication despite their 99-1 advantage in global numbers and consensus. I have shown that Australia's discourse has been actively addressed by sceptical scientists—usually non-specialists in climate change research—who fail to adhere to the same communication rules as the mainstream (e.g. by neglecting peer review while actively offering opinions).

The effectiveness of fostering uncertainty is indicated when this communication activity is shown to correlate with public confusion and official inaction from the mid to the later 1990s and beyond. One can further suggest from these events that in the public mind one scientist may be much the same as the next, an impression fostered by the media.

In the next chapter, I look more closely at the significant communication influence of uncertainty.

CHAPTER NINE

IN SEARCH OF CERTAINTY AND APPLYING UNCERTAINTY — EFFECTS ON THE CLIMATE CHANGE DISCOURSE

"Since the early 1990s, the fossil fuel lobby has mounted an extremely effective campaign of deception and disinformation designed to persuade policymakers, the press, and the public that the issue of climate change is stuck in scientific uncertainty."

Gelbspan, 2004, p. 40

INTRODUCTION

This chapter looks in greater depth at the theme "certainty/uncertainty" identified in earlier chapters as a key framing strategy both deliberate and incidental in the public discourse. Because this framing is so central to expressions of public understanding, a more in-depth exploration of it as well as some science history context can make a useful contribution to understanding communication of climate change and other controversial environmental science.

The significant role played by the scientific communication of certainty in the early adoption by Australians of greenhouse public knowledge was summarised by Henderson-Sellers in 1993 as follows:

> Clear statements of scientific confidence in the greenhouse phenomenon in the mid-1980s prompted demands for policy, and hence for policy awareness. In Australia, as in many other countries, public and political awareness of the possibility of greenhouse-induced climate change increased. (Henderson-Sellers, 1993, abstract)

This and other evidence from that period discussed in chapter 4 indicates that scientists and journalists and policy-makers expressed "certainty" in the early 1990s and that this

was a key driver in the political and public understanding exhibited between 1987 and 1992. The evidence presented in earlier chapters suggests that the language of scientific certainty/uncertainty not only changed, but that uncertainty was also deliberately constructed to throw doubt on the scientific conclusions.

This was so not only in Australia but also globally. In the United States, whose climate change "science and society" discussions closely resembled those in Australia, atmospheric scientist James Hansen (who has spoken out about the risks of anthropogenic climate change over the course of two decades) addressed the US Congress in 1988. He said he was 99% certain that global warming had begun, based on the series of warm years in the 1980s (White, 1990). "The public took notice. His opinion prompted Congress to consider whether the prudent course was to move rapidly to *legislation* aimed at preserving the habitability of the planet from catastrophic consequences" (White, 1990, p. 22). I emphasize legislation in this quote because it is indicative of the times, when regulation on behalf of risk containment was not considered out of bounds.

BACKGROUND

In his comprehensive review of the arc of US climate change public communication up to mid-1990, Robert M. White, then President of the US National Academy of Engineering, recounts that internationally, political leaders took action between 1988 and 1990 based on the certainty of scientists' language and also thanks to the drought at the time that greatly focused attention. White's own reaction was caution about accepting the science, nevertheless he presents a broad account of the issues and influences at that time. After the politicians got on board with the climate science, the counter-framing started. White recounts how sceptics in the scientific community joined open debate in the pages of *Science* on the certainty and validity of climate science (White, 1990, p. 22).

He makes clear that public knowledge at the time acknowledged that the energy economy of current civilization was the issue along with land and water use and the effects of population increase. Interestingly, while sympathetic to the sceptics, he had

no quarrel with the concept of human agency, saying that this understanding has deep historical roots within science. He also describes intervention in the policy process by advocates of uncertainty in the form of sceptics Richard Lindzen and Frederick Seitz, who, together with a long-range weather forecasting expert and several other scientists, wrote to President George H.W. Bush questioning the science and urging research rather than action. "Thus the great climate debate had been joined" (White, 1990, p. 22).

Previous studies on scientific certainty on this topic are also enlightening with particularly relevant work from US science historian Naomi Oreskes. In a 2004 study she tested the argument that behind the conventional scientific language, couched in degrees of certainty or uncertainty, there is no consensus in the published literature on the occurrence of anthropogenic climate change. Oreskes showed this is not so. She pointed out that not only the peer reviews conducted by the Intergovernmental Panel on Climate Change (IPCC) but major scientific bodies and professional societies in the US including the national Academy of Sciences, have issued statements that the evidence is compelling for the understanding that humans are warming the planet and she showed that there is no large body of dissenting opinion.

Oreskes[62] analysed 928 abstracts published in the refereed literature between 1993 and 2003, listed in the ISI database with the keywords "global climate change". She found no disagreement on the existence of this phenomenon:

> …scientists publishing in the peer-reviewed literature agree with the IPCC, the National Academy of Sciences, and the public statements of their professional societies. …Politicians, economists, journalists and others may have the impression of confusion, disagreement, or discord among climate scientists, but that impression is incorrect. (Oreskes, 2004, p. 1)

Five years later, in 2009, a survey published by Peter Doran and Maggie Zimmerman of Earth and Environmental Sciences at the University of Illinois came to a similar

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[62] Oreskes told a reporter she decided to test the consensus after her hairdresser said *she* wasn't worried about global warming because scientists "don't know what's going on".

conclusion as Oreskes. They canvassed more than 10,000 earth scientists and received responses from 3146. Of these more than 97% of the specialists on the subject (i.e. "respondents who listed climate science as their area of expertise and who also have published more than 50% of their recent peer-reviewed papers on the subject of climate change") agree that human activity is "a significant contributing factor in changing mean global temperatures" (Doran & Zimmerman, 2009).

They state in conclusion: "It seems that the debate on the authenticity of global warming and the role played by human activity is largely nonexistent among those who understand the nuances and scientific basis of long-term climate processes" (Doran & Zimmerman, 2009, p. 23). Relevant to the discussion in the previous chapter about the epistemic values of some geologists and meteorologists, they found that these two fields had the lowest "yes" response to the question about whether human impact is changing mean global temperature (47% and 64% respectively compared with 82% for the group as a whole.)

Oreskes (2004a) also addressed the related issue of a demand for "proof" in the climate change discourse: arising both from a misunderstanding of scientific conventions and the deliberate deployment of uncertainty by climate change contrarians of various persuasions. Referring to the societal defenders of the economic status quo and their attack on environmental science in general, Oreskes notes that mitigation of environmental impacts inevitably raises costs for some sectors who seek to influence the policy process against any such actions. Demanding proof of environmental impacts has long been a convenient stalling mechanism. Thus:

> ….informed defenders of the status quo…argue that the scientific information pertinent to an environmental claim is uncertain, unreliable, and fundamentally unproven. Lack of proof is then used to deny demands for action. But…..in all but the most trivial cases, science does not produce logically indisputable proofs about the natural world. (Oreskes, 2004a, p. 369)

According to Oreskes (2004a) the historical record shows that no major scientific paradigm shifts in understanding on how the planet works (e.g. the once radical and

contested evidence for continental drift or ice ages) have waited for absolute proof. Against that science history context, one can ask whether the contemporary desire for an ideal relationship between science and policy based on incontrovertible proof or "the truth" may be influenced by the normative structures of economics, a discipline that has yielded a good crop of sceptics on climate change. Normative assumptions and beliefs are not based on empirical data but tell us how the world *should* operate. Practitioners can therefore make or expect absolute pronouncements.

From the same paper (Oreskes, 2004a), contemporary climate change discourse can be compared to the story of what happened with marine biologist Rachel Carson and her seminal 1962 popular science book *Silent Spring*. That research and book were about the effect of pesticides on biological systems including humans. The book was credited with giving the public a first-time understanding of the potentially disruptive effects when synthetic chemicals enter the environment and about environmental pollution generally. But not before Carson was pilloried (an onslaught that is still a staple of contrarian websites) for relying on case studies rather than on the certainties of statistical evidence, notwithstanding the book was aimed at the popular market. She was also charged with engendering fear (therefore charged as being emotional and unscientific) about the consequences if humans continued down a reckless path *vis a vis* the natural environment.

This classic case of science history highlights the difficulties that continue to face many environmental scientists dealing with complex and evolving systems within a reductionist scientific culture that does not recognise evidence unless it is counted and measured. Parallels can be drawn with climate change where measurable evidence lags behind modelling and proxy data, leaving the door open to disciplinary arguments about certainty. Indeed, scientists interviewed for this investigation point to the demands for measurable evidence in both the ozone depletion research of the 1970s and more recently with climate change – in both cases encouraging years of delay to effective action (e.g. I. Lowe, thesis interview, April 2007).

On the other hand, the tenor of the support Rachel Carson gained from a 1962 President's Science Advisory Committee (PSAC) review (under President John F. Kennedy), is also very instructive.

Oreskes describes this review as notable for its brevity and clarity (good communications). It acknowledged the trade-offs of all human activities, but concluded on balance that more harm than good might be the long-term outcome of pesticides for plants and animals including humans. "PSAC never claimed that the hazards of persistent pesticides were 'proven', 'demonstrated', 'certain', or even well understood; they simply concluded that the available data were adequate to show that harms were occurring, warranting changes in the pattern of pesticide use…" (Oreskes 2004a, p. 374). The panel took seriously suggestions for alternative technologies; did not accuse Carson of hidden agendas; and did not use uncertainty as a justification for inaction.

Perhaps most significantly—compared to discourses of recent decades and the study period which are quite different—the PSAC placed the burden of proof and certainty not on the public interest scientists but on the emitters or polluters, in this case, those who argued that persistent pesticides were safe. The climate change analogy is that those who argue that humans are *not* having an impact would face the burden of proof. This perspective is recognizable in the aims of the ecologically sustainable development process minted internationally with the Brundtland Report in the late 1980s and initiated in Australia during the Hawke federal Labor government (Hawke, 1989).

Equally relevant is the way Oreskes characterises the scientists who attacked Carson and her work in the 1960s. Carson's opposition came principally from industries that made or relied on environmental chemicals including the food industry and their related scientists. Allowing that many had ties to the pesticide industry, Oreskes argues that many also had other "epistemic" interests (systemic beliefs and values). Recognizable as a constructivist analysis, she writes: "All debates involve underlying commitments, and clarity requires addressing those commitments…. Many of Carson's critics were food scientists dedicated to a large and inexpensive food supply…they were not ashamed to value immediate human concerns over long-term ecological concerns" (Oreskes, 2004a, p. 376). Similarly, some of the more aggressive but persuasive arguments for demanding proof and certainty from climate change science have come

from people committed to equity and "progress" for developing societies through fossil fuel energy technologies.

HOW SCIENTISTS' LANGUAGE CONTRIBUTES TO "UNCERTAINTY"

Looking back throughout the study period, observers interviewed for this thesis had gained the impression that many specialist climate change scientists retained the basic scientific convention of cautious communication. Journalists were not the only ones to comment on this. It was noted as early as 1989 that there was a disjunct between scientific and public understanding when percentage uncertainties were cited. Climatologist Ann Henderson-Sellers told a reporter that:

> There was a big furore in the USA during the past year when a scientist told a Senate enquiry, he was 99 percent sure that the Greenhouse Effect was with us now. Unfortunately, a number of my colleagues disagreed with him because they're only 95 per cent sure, and the media had fun with that. Yet when I surveyed a number of people about what level of confidence they wanted from the scientific community— before they'd start planning for the future— the answer was 50 per cent. (McKenzie, 1989, p. 34)

In 1997, Canadian researcher Henry Hengeveld examined the contribution of scientists' own style of communication in promoting the confused public discourse that had taken hold by the mid 1990s and has continued. He reviewed 885 papers published on climate change in 1994-95 and noted the effects on policy. He wrote:

> Although misinformation spread by self-interest groups is a factor, the scientific community has been ineffective in communicating its information and concerns in a manner useful and comprehensible to lay audiences. Furthermore, when advising politicians, the scientific community has devoted considerable attention to uncertainties, and has sought to adopt a position of "objective neutrality" that has allowed advocacy groups with vested interests to dominate the advice on

> options for policy response. Some authors have suggested that scientists should take a more proactive role as policy advisors, while in Australia pretty well the opposite happened over the 1990s. (Hengeveld, *Climate Change Newsletter, 9,* 1997, p. 21)

The Age journalist Geoff Strong said he has pondered why it has taken so long for the scientific messages about climate change to push through to real action. One problem he highlighted is that the scientific definition of certainty sounds like equivocation to the general public and to their elected and often scientifically ignorant representatives (Strong, thesis interview, July, 2007). Elsewhere Strong notes that he was reporting on the greenhouse phenomenon 20 years ago and that scientists emphasised the uncertainties even then, and continued to do so during subsequent years. He says they wrote in terms like:

> Well we are not 100 per cent certain but…in science-speak, that means they could have been 95 to 99 per cent certain but were leaving the 1 per cent margin for error in case somebody ripped them apart in a scientific paper … The world's greatest gamblers, the insurance industry, didn't need that level of certainty. It had been banking on scenarios being right since at least 1995. (Strong, 2005, p.1) [63]

Reflecting on the communication framing by the mid 1990s, CSIRO Division of Atmospheric Science adviser and communicator Willem Bouma told Strong that in hindsight perhaps scientists should have worded their predictions differently and conveyed more certainty because two decades have been lost. Strong amplified this sentiment thus: "By appearing uncertain, they might have protected their backsides, but allowed a whole army of vested interest groups such as the fossil-fuel lobby and right-wing think tanks to attempt to lever apart the argument and create 20 years of delay" (Strong, 2005, p2).

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[63] This article by Geoff Strong found its way via the internet to a climate change blog – desmogblog.com ("we're here to clear the PR pollution that clouds the science on climate change"). The writer, Jim Hoggan, contrasts Strong's article to the US *Cape Cod Times* for 30 Oct, 2005 which, he says, provides a perfect example of why climate change deniers are still in there with a fighting chance. *The Times* lauds a climatologist for perfect integrity "the absolute insistence on total scientific certainty..." (desmogblog .com 2005)

It is arguable that the later retreat from the active and definite language in communication that characterised the early study period simply removed an atypical anomaly from scientific communication and that the highlighting of uncertainties signalled a return to more comfortable communication for many scientists. On the other hand, reviewing the evidence from 1992 on, it also must be considered whether there was a deliberate element to this retreat into convention: defence against an increasingly hostile ideological environment.

This enquiry has found evidence in the early study period that when the language of scientists and journalists was couched without uncertainty caveats, clear scientific messages can be identified in correlation with government policy action to a remarkable degree. This enquiry also found that political leadership, values and ideology and media agreement and co-agenda setting, all played significant roles in that consensus, as presented in earlier chapters.

The evidence from government, business and other public documents, and several hundred popular news articles from the whole study period show clearly that a certainty of language framed the discussion about climate change in the early period and was absent later – leading over time to impressions of debate and uncertainty. Three examples illustrate how the language expressed certainty: IPCC report, sample newspaper article and government document.

PUBLIC LANGUAGE OF CERTAINTY AND EARLY ACTION

The 1990 IPCC Report

Research for this thesis analysed the first, 1990, IPCC report (Houghton, Jenkins & Ephraums, 1990) that has been all but forgotten in contemporary discussion of the IPCC assessments delivered to national governments. Two things stand out from the 1990 report in comparison to the 1995 and 2001 reports. Firstly, it provides confirmation that the basic science findings and impacts hardly changed over the study period. Secondly, the communications style and language did change markedly in later reports—to a

language of greater uncertainty and, stylistically, reverting to disciplinary jargon and technical detail.

The 1990 report is in fact characterised by a notable level of "plain English". The scientific assessment report executive summary starts: [my emphasis in italics]

> We are *certain* of the following:
>
> There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be.
>
> Emissions *resulting from human activity* are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases *will enhance the greenhouse effect*, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming *and further enhance it.*
>
> We calculate *with confidence* that:
>
> inter alia
>
> Continued emissions at present rates of long-lived gases carbon dioxide, nitrous oxide and CFCs will commit the Earth to increased atmospheric concentrations for centuries ahead.
>
> [Impacts] Under a business as usual scenario a global mean temperature increase *of about 0.3 degrees C per decade* with an uncertainty range of 0.2–0.5 degrees C— this is greater than that seen over the past 10,000 years. With controls under different scenarios, the rates of increase could drop by 1/2 or 2/3.
>
> The authors admit many *uncertainties in predictions* of timing, magnitude and regional patterns due to incomplete scientific factors such as sources and sinks, clouds, oceans polar ice sheets (Houghton et al, 1990, p. xi).

The introduction that follows this executive summary again speaks plainly and with confidence making the document very accessible to a politician, journalist or other lay reader. This first IPCC scientific report was described by its Chairman Dr John Houghton as the work of "most of the active scientists working in the field. Some 170 scientists from 25 countries have contributed either through international workshops or written contributions". A further 200 scientists were involved in the peer review of the draft report (Houghton et al., 1990, foreword p .v). It therefore summarised the known body of research at the time and felt able to report with certainty.

Houghton acknowledges minority opinions exist but says the peer review of the draft report helped to ensure a high degree of consensus amongst authors and reviewers of the information presented (and presumably of the language used to communicate). "Thus the assessment is an authoritative statement of the views of the international scientific community at this time," (foreword p.v). He finishes his foreword in July 1990 on a hopeful note:

> I am confident that the Assessment and its Summary will provide the necessary firm scientific foundation for the forthcoming discussion and negotiations on the appropriate strategy for response and action regarding the issue of climate change. It is thus a significant step forward in meeting what is potentially the greatest global environmental challenge facing mankind (foreword p .vi).

However the next 10 years would see this confidence undone.

1988 and 1990 news articles

Newspaper reports and government documents from that period provide triangulating evidence of similar matter-of-fact certainty in Australian media and government sectors during the same period. Along with evidence I have presented in chapter 4 in greater detail, the following 1988 and 1990 documents show the framing of language at the time, consistent over almost all articles and government documents accessed from that

period. The 1990 article incidentally also provides historical evidence on the role of government economists, whose considerable influence is explored in chapter 6, and who succeeded in blocking Australia's early attempts at an active greenhouse response in the face of clear science messages.

ENVIRONMENT PROBLEMS SEEN WITH FOSSIL FUELS

By Sarah Sargent, 26 July 1988, *The Australian Financial Review,* p.48

Environmental problems associated with the "greenhouse effect" could force the world to replace fossil fuels with nuclear energy - which would give Australia the opportunity to become the foremost uranium supplier, according to a leading petroleum industry expert.

Mr Bob Foster, general manager, external relations, for BHP Petroleum said last week: "Australia can lead the world on how to mitigate against the greenhouse effect".

He said the Australian conservation movement might realise that the greenhouse effect, caused by an upper-atmosphere build-up of gases when fossil fuels were burnt to supply energy, was more damaging to the environment than nuclear power generation, which did not produce gaseous wastes.

POLLUTERS PUT ON THE BACK-BURNER

By Mike Seccombe, 6 September 1990, *The Sydney Morning Herald,* p.1

CANBERRA: The Federal Treasury is determined to block moves by the Government to make industry cut down on greenhouse effect gases.

On Monday, when Cabinet meets to consider targets for the reduction of greenhouse gases, the Treasury is set to attempt to delay the matter for up to a year by demanding a new inquiry into the problem.

Government sources believe the suggested inquiry will be a cost-benefit analysis by the Industry Commission of the likely effects of curbs on industry.

Such a move would stymie a submission by the Minister for the Environment, Mrs Kelly, for the immediate imposition of a target reduction of emissions by 20 per cent by 2005.

The Treasury would not confirm that its preferred course was referral to the Industry Commission, but said it believed that no conclusive reports on the value of targets had been done, and more investigation was needed. A *promise of quick action on establishing greenhouse emission reductions was a key plank of the environment policy which played a major part in the Government's election win this year.* [64] *[*My emphasis in italics, highlighting the repeat patterns of public knowledge and election promises.]

The Treasury view also ignores the United Nations Intergovernmental Panel on Climate Change (IPCC), which says drastic cuts in emissions of about 60 per cent are needed for the problem to be stabilised.

In a speech yesterday, Mrs Kelly called again for immediate action. She stressed the IPCC findings and said that "the sensible course of action is to do what we can, as soon as we can".

1989–1992 government reports

In December 1989, an Inquiry by the Senate Standing Committee on Industry Science and Technology showed its understanding of the phenomenon and looked at ways and means to reduce the impact of the greenhouse effect with these words:

The experts with whom the Committee met confirmed that there is irrefutable scientific evidence that the composition of the atmosphere has been, and continues to be, altered significantly by human activity.

There is the risk that if the response to this problem is delayed until the evidence of significant climatic change is irrefutable, it may be too late to avoid some of the more extreme changes that could occur…slowing and reversing the changes

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[64] In 1990 and 2007 promises of action on climate change were credited with helping swing a Federal election -- only for the promised action to eventually evaporate. In both cases the electorate was credited with being aware and eager for action.

> in the atmosphere will be slow and difficult. Consequently, it is essential that an early start be made in implementing changes … (Commonwealth, 1989a, p. 1).

In its own words, this Senate committee accepted the scientific evidence of atmospheric change, and that it was induced by humans. It did not require 100% measured certainty of climate change in order to take action, which was understood to become more costly with delay. The committee communicated all this in certain language.

In 1989 the Australia and New Zealand Environment Council (ANZEC) in an agenda item on the draft National Greenhouse Strategy urging all state governments "as a matter of priority to pursue all available measures to reduce greenhouse gas emissions" (ANZEC, 1989). I have already shown that by 1990 many states had developed response plans.

Also in 1989, the Hawke government released a state of the environment report wherein a response to anthropogenic climate change featured prominently. It said "The growing consensus amongst scientists is that there is a strong possibility of global warming with major climate change and that this is linked with the levels and nature of industrial and agricultural activity. Significant climate change…would have major ramifications for human survival" (Hawke, 1989, p.28). This document (which also phased in the era of Landcare and tree planting) agreed that waiting for "conclusive scientific evidence" was not necessary but an early start on action was. A year later, in October 1990, the Federal Government adopted its interim planning target to reduce greenhouse gas emissions by 20% (from 1988 levels) by the year 2005 (Commonwealth, 1990).

As late as 1992, as the Earth Summit at Rio introduced the Framework Convention on Climate Change to drive the international agenda on this topic, one continues to find certainty of language in Australian federal government documents. For example, a 1992 Federal Government climate change newsletter confirms that the discussion had gone well beyond debating whether the greenhouse phenomenon exists or not and was dealing with the emission reduction targets. Significantly, this newsletter acknowledges that energy demand management (i.e. efficiency) could make a major contribution to achieving the government's reduction targets (Commonwealth, 1992a).

At the time, the newsletter was edited by the Department of Primary Industries Climate Change Group where it remained until late in the 1990s, produced by the Bureau of Rural Resources. The change in its language over the study period is telling. From the perspective of this thesis, what is most notable, and typical of the early study period, is the language of acceptance and certainty, as well as the framing of do-able responses, that were subsequently reframed as being unacceptable or undo-able. For example the February 1992 lead article outlines the government's ESD (Ecologically Sustainable Development) Greenhouse Working Group report to the Department of Arts, Sports, Environment and Territories and its scientific credentials.

The target (in emission reductions) was achievable with: "no reductions in business-as-usual levels of energy services by a combination of demand and supply-side measures but that achievement would require high levels of government intervention" (Kretschmer 1992, p. 1). The high level of government intervention, principally through managing demand by encouraging efficiency, fuel substitution and urban planning would become unacceptable, ideologically, during the remainder of the study period. But while it was a real option, it shows how certainty appeared in tandem with strong policy response.

"UNCERTAINTY" MARKS REFRAME AFTER 1992

Through much of the 1990s there raged a war of ideas for influence between bureaucratic departments, particularly between environment and industry plus foreign affairs and trade (J. Kerin thesis interview, January 2008). This war of ideas in the bureaucracy reflected the society-wide economic *versus* environmental ideological paradigm. It was a valuable tool for those who framed Australia's "national interests" as synonymous with the existing energy and export system, to characterise as "uncertain" the environmental science that challenged the economic policy agenda and, similarly, to marginalise environmental scientists and advocates within the dominant discourses.

Royal Melbourne Institute of Technology academic Alan Pears advised the Victorian government on revising its energy policies before the politics in that State shifted to economic rationalism by 1992. He says that a powerful weapon wielded to keep the energy supply status quo in the 1990s was to discredit the science. Along with economic modelling on costs, uncertainty about the science helped to reframe the public discourse to jobs and costs by the mid 1990s. "By 1994 ABARE had convinced the Department of Energy with its [economic] modelling" (A. Pears, thesis interview, 2006).

Pears described 1992 as the tipping point—away from policy progress on climate change action backed by public knowledge, definite communication and positive leadership. This correlated with the ascent of Keating federally and with the change of government in Victoria—and the evolving dominance of economic rationalist policies as discussed in chapter 6. Public messages became framed as "any action is going to hurt", costing jobs and driving up prices, while the science is uncertain.

Former policy adviser Sue Salmon saw this first hand in Parliament House in Canberra. The weak position of the Department of Environment, which was the conduit for the science, was later reflected in the further marginalisation of the environment movement under Prime Minister John Howard (1996 on) and the lack of interest in what the science, including the IPCC, actually had to say. "There was a whole lot of that 'bring in a sceptic' strategy and it was understood that public confusion made it easier to continue with business as usual," (S. Salmon, thesis interview, 2006). She also recalls the strong presence of lobbyists from the coal and paper industries. "Their message was effective and powerful. It was about income and jobs while we were talking about degrees of uncertainty".

Thus, uncertainty assumed a more prominent role in the framing of the discourse as the 1990s progressed. One journalist working at *The Age* at the time remembers the uncertainty that crept in:

> The question was, is it real or scaremongering? Legitimacy comes when the government is taking it seriously. Under Hawke it was big profile. Keating couldn't give a stuff about the environment and it went back to a junior ministry;

> the media follows what politicians are talking about so then politicians stopped talking about it and the media stopped too; meanwhile the community thinks it is being "fixed" (C. Miller, thesis interview, March, 2007)

IPCC language change by 1995

Not only were there domestic scientific sector, political and ideological changes promoting uncertainty by the mid 1990s, there was also a change in IPCC language after 1990. According to the late US atmospheric scientist and IPCC member Stephen Schneider, polemical commentators from the (anti greenhouse science) Global Climate Coalition were pressuring IPCC members and, at the same time, politicians got more involved in the reporting process (S. Schneider, thesis interview, July 2007). Ironically, it had been Schneider who was reportedly persuasive in 1988 in convincing governments and scientists at the seminal Toronto conference—which led to the establishment of national emission reduction targets—that plain and forceful communication was the way to go.

Then *Sydney Morning Herald* (SMH) journalist Leigh Dayton, in setting up context for the 1995 IPCC report, painted a vivid picture about the anxiety to communicate forcefully that drove participants at the Toronto conference:

> The anxious experts feared that if human beings continue to load the atmosphere with heat-trapping greenhouse gases like carbon dioxide— produced, largely, by burning coal, oil and wood—the world would be doomed to an "impending crisis" of unbridled climate change: global warming, increased storms and droughts, sea-level rises and other extreme and hard-to-predict weather events, not to mention the human chaos and suffering that would ensue.
>
> But what could a group of scientists, administrators and environmental hangers-on do? "Give the public and politicians firm answers, not statements of scientific uncertainty," vehemently argued one young turk, Dr Stephen Schneider, now a leading climate modeller at Stanford University in California.

> And so they did. To this day the final statement from that extraordinary meeting remains one of the most unnerving scientific pronouncements ever made: "Humanity is conducting an enormous, unintended, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war"; it is "imperative to act now". (Dayton, 1995, p.29)[65]

A few years later Schneider had changed his mind. Looking back in 2007, he cited the pressure from corporations in oil, coal and gas on the international IPCC process. In response he said he was the driving force behind correlating the terms "likely" and "very likely" to percentages of certainty in subsequent IPCC reports in an effort to standardise the language. I asked him: "Did it work"?

> Well it worked for scientists. Not sure what the public got out of it. But I believed that the public would settle for lower percentages if framed by credible scientists. Credibility of the scientists is key. (However) there is the related problem of scientists not drawing conclusions under the framework of not overstepping the policy line because of politicians' censure (S.Schneider, thesis interview, 2007)

I observed [post study period] an example of how that scientific uncertainty framing plays out in popular discourse during an exchange between scientist/science communicator Tim Flannery and journalist Tony Jones on ABC Lateline in May 2007. Flannery was asked to comment on the British Channel 4 documentary that the ABC proposed to screen, *The Great Climate Change Swindle,* which criticises the concept of anthropogenic climate change as a hoax perpetrated against the promise of Third World development. Flannery said the documentary did not reflect the consensus of scientists globally, namely: that it was "90 per cent certain" that human activity produced the enhanced greenhouse gases causing climate change. Phrasing it this way, caused Jones

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[65] Leigh Dayton and her colleague at *The Sydney Morning Herald* Gavin Gilchrist wrote a number of detailed and unequivocal articles in the months following the 1995 release of the 2nd IPCC assessment report – outlining the extreme weather and other risks posed by ongoing global warming and climate change. These articles like others from the period from *The Sydney Morning Herald* and *The Age* provide an excellent historical record for the assertion that many science reporters remained convinced and certain and that most of what is currently understood about climate change was understood then as well – despite the possible communication barriers of a less user-friendly IPCC report.

to respond "yes but, that means there is 10% uncertainty, which surely leaves an opening for this sceptic debate?"

CSIRO atmospheric scientist Michael Raupach explained in a 2007 thesis interview:

> The sceptics [internationally] have been very active throwing "sand in the gears" and causing the IPCC to use very carefully calibrated language. Lots of people including me think the IPCC has been erring on the conservative side. The sceptics have been very influential on our government so scientists have had to moderate their language so people in policy would listen. [In so doing] CSIRO has been pulling its punches on climate change, especially in the mitigation area – we have failed at plucking the so-called 'low-hanging fruit' [the easy solutions like energy efficiency]. We are not doing anywhere near what is needed. [At the same time] sceptics like the Lavoisier Group have wedged open any uncertainty. (M. Raupach, thesis interview, May 2007)

In the same interview, Raupach gave a scientist's unvarnished view of what was going on and what was needed. He said Australia at a minimum had to put in place a 3% annual reduction from current energy consumption generated through conventional coal and oil-fired means. He said that governments had failed to grasp this necessity and that "all this talk about cap and trade [emissions trading], nuclear and clean coal, are just "greenwash" to avoid confronting the need for real strategies for rapid, sustained reductions in fossil fuels.

Uncertainty pressure on the media

By the later 1990s, as the federal Coalition increased the uncertainty rhetoric, some journalists, who continued to interpret in plain English what the scientists were saying, were also feeling the pressure according to Geoff Strong at *The Age*. "I was taken to the Press Council in 1999 by a reader for writing about global warming a decade on. My alleged crime was I hadn't given oxygen to those who didn't believe" (G Strong, thesis interview, July, 2007). Former ABC environmental journalist Alan Tate, who says the

ABC was "completely supportive" during the 1990s of reporting on climate change, recalled that his bosses there were inundated with emails from sections of corporate Australia decrying that coverage and calling for his sacking (A. Tate, thesis interview, June 2006).

Tate said the strategy as he saw it coming from industry complainants was to "sow doubt about the climate science". How did they operate?

> Through seminars, forums, and climate sceptics. The coal industry and Rio Tinto had the ear of the Prime Minister and the Canberra press gallery and [most of] corporate Australia was disengaged until after 2000… the green movement was still heavily focused on forests and also disengaged. [This led to] a completely confused public discourse.

Tate concurred with others who have said that the Canberra press gallery drove the media point of view through most of the 1990s and beyond. By the time Tate left the ABC in 1998 the "deep uncertainties idea" had settled with the editors at the national broadcaster.

In this way, public knowledge was nudged towards more 'balance' that became a normal part of reporting on climate change, as shown in chapter 7, and balance was hedged by uncertainty. Another environmental journalist active in the 1990s, Murray Hogarth, said it was easy to find an opposing point of view and that often there was a problem with Australian scientists willing to be quoted at all, or quoted in a simple and understandable way (M. Hogarth, thesis interview, June 2006).

Government and Media Texts in Mid-1990s

By 1995, language in the IPCC science summary for policy-makers (which may be the only document most politicians and journalists read) had become more diffuse and technical and open to interpretation. While saying the 1990 predictions and scenarios

had held, the science summary is considerably less to-the-point than the 1990 version and more long-winded. Thus the reader must get to p.4 before learning that:

> The balance of evidence suggests a discernible human influence on global climate; Any human-induced effect on climate will be superimposed on the background "noise" of natural climate variability...[and p.5] our ability to quantify the human influence on global climate is currently limited because the expected signal is still emerging from the noise of natural variability, and because there are uncertainties in key factors. These include the magnitude and patterns of long term natural variability and the time-evolving pattern of forcing by, and response to, changes in the concentrations of greenhouse gases and aerosols, and land surface changes. (IPCC assessments 1995, Working Group I, pp. 4-5)

The 1995 Working Group 3 summary for policy-makers on social and economic responses reads like an academic economics treatise, perhaps reflecting its authors' disciplines (Lee & Haites, 1996). It sends no urgent signals and may well have remained unread by policymakers because of its communication style, limiting its value as a research summary on potential response actions.

A relevant insight on this form of official or bureaucratic communication is in a report published by two US science policy pressure groups: the Government Accountability Project (GAP) and Union of Concerned Scientists (USC). The report, *Atmosphere of Pressure: Political Interference in Federal Climate Science,* (2007), documents tactics during the George W. Bush administration in US federally-funded departments and agencies dealing with resource and environmental matters. One of the documented communication tactics (gleaned from some 300 interviews with scientists) is to retreat into the difficult, technical and inaccessible. Other strategies include denying media access, political operatives changing language intended for the public and changing press releases to insert uncertainty.

The next, 2001, IPCC science report continues with a technical style of language and delivery with an emphasis on measurable changes in greenhouse gas composition and

weather outcomes. The summary for policymakers announces within the second paragraph that it describes the current state of understanding of the climate system and "its projected future evolution and their uncertainties" (IPCC assessments, 2001, Working Group 1, p. 2). It lays out its "judgmental estimates of confidence" along the likely, very likely continuum. Thus, virtually certain = greater than 99% chance that a result is true; very likely = 90-99% chance; likely = 66 -90% chance…and so on down through medium likely, unlikely.

In the 2001 report the reader is told that it is "very likely" that the 1990s was the warmest decade and 1998 the warmest year in the instrumental record since 1861. Proxy record data going back 1000s of years is "likely" to be certain, which translated still allows a range up to 90% certainty. Measurements of climatic changes like precipitation (rainfall), and night-time temperature increases are similarly hedged.

The uncertainty and desire for another opinion that this language is liable to cause in a lay audience was suggested earlier in this chapter. In this 2001 IPCC report—targeted at the lay decision-makers in policy circles—it is not until p.5 that a discussion about human agency in global warming is initiated and that discussion is quite technical. Anthropogenic or human influence is described thus: "The influence of external factors on climate can be broadly compared using the concept of 'radiative forcing' " footnoted with a technical explanation.

Technical language in the 2001 report talking about positive or negative "radiative forcing" may be compared with the easily understood 1990 report that describes the same processes as warming and cooling or mean temperature increases. Similarly, what the 1990 report called emissions resulting from human activities that are increasing concentrations of greenhouse gases (see citation from 1990 assessment earlier in this chapter) is later called "increased concentrations of atmospheric constituents" in 2001. It is not until the second last page (p. 7) that the reader learns human activities have continued to increase greenhouses gases and "their radiative forcing" since the 1995 report and that this is due to fossil fuel burning and "land-use changes"—a benign-sounding jargon term that mostly refers to deforestation. This end section does have a plain-English summary of the influences and measured outcomes of anthropogenic

climate change. I suggest a good communication practice to a lay audience would have put it at the front of the document. On the other hand, the reader *is* offered the intensely debated (by sceptics) hockey stick graph. This graph (Figure 3 in Box 1, chapter 2) shows that CO_2 has spiked since the late 1800s, roughly paralleled by rising temperatures.

Overall, while it is possible that the 2001 summary for policy-makers assumes the readers already have a grounding in the science of human-induced climate change and thus would appreciate a technical update highlighting uncertainties—with the plain-English summary at the end—the risk is that policymakers would again find it hard to decipher or to grasp an urgency to act. This might be particularly so in the political context that prevailed with George W. Bush presiding over the US government and John Howard over the Australian Federal government. Both governments for political and ideological reasons welcomed the delay potential of uncertainty.

The Federal Government's Climate Change newsletter had also largely retreated into technical reports by the latter 1990s compared with its earlier direct and accessible news reports. The overall picture is that a focus on measurement and technical, quantified reporting became the yardstick of credibility and also a way to justify 'go slow' as the 1990s wore on (I.Lowe, thesis interview, April, 2007).

Assisting the climate of uncertainty by the late 1990s was a new media trend to frame climate change as debate and opinion, analysed in detail in chapter 7. This involved "balancing" sceptic tracts against science stories on or near opinion pages in *The Sydney Morning Herald* (SMH) and, in the business pages of *The Australian Financial Review* to regularly call climate change a "debate" and to quote sceptical opinions as science context[66]. The upsurge in opinion pieces in the SMH is shown in Figure 10. There was also a trend to treat each IPCC report as discovering anthropogenic agency for the first time, as shown in the following 2001 SMH story.

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[66] Sceptical treatment was not monolithic in *The Australian Financial Review,* possibly adding to reader confusion. At the time of the 2001 IPCC report, several stories appeared, including about the insurance industry's concerns, that were framed as quite certain about climate change and its connection to the fossil fuel-based economy. For example Huck and Macken' report *Fossil Fools* (2001).

SIX DEGREES HOTTER: GLOBAL CLIMATE ALARM BELLS RING LOUDER

By John Schauble, Herald Correspondent, 23 January 2001

World temperatures may increase by as much as six degrees Celsius over the next century, leading climate change scientists say in an alarming report that adds new urgency to the warnings on global warming.

The projected increase, which would be the most rapid temperature change in the past 10,000 years, is expected to push sea levels up by nearly a metre, threatening tens of millions of people, and generate more floods, droughts and fires.

The report found that the 1990s were the hottest decade since instrument records were first taken in 1861 and that 1998 was the hottest year. *And for the first time scientists agreed that the warming is mostly due to human activity* [emphasis mine].

The last sentence above is demonstrably untrue, as can be shown from reports since 1990 (IPCC 1990, 1995, 2001) and examples quoted earlier in this and other chapters. This "just discovered" human agency can be identified in media reports on successive IPCC assessments. I suggest it provides a further example of how communication reframing can proceed in the media as well as of reporters' dispensing with context and background.

What was Happening to Public Interest Science?

Another avenue to the perception of uncertainty was the incremental chilling of scientists' ability to communicate the consequences of climate change as they were likely to affect policy and society. Here I take a brief look at evidence for this micro influence on the discourse and suggest it is an important topic for further exploration. As early as 1987, change was affecting the major scientific body involved in Australian atmospheric research. An October 1987 government internal memo on climate change sounded the alarm:

> The recent restructuring of the CSIRO and the modification of the criteria used for determining research priorities under its recently adopted corporate management strategy, may, however, curtail the continuation of this work unless a major funding sponsor comes forward. There does not seem to be similar research being undertaken by any other organisation within Australia. (*Climate Change due to the Greenhouse Effect,* 1987).

Former MLA Bob Chynoweth who was on the advisory board of the Division of Atmospheric Research in the early study period said the public interest science in the CSIRO was gradually "squeezed down" as the organisation was reorganised (R. Chynoweth, thesis interview, November, 2006). This was to have significant bearing on scientists' ability to communicate freely, particularly from 1996 on with the Howard Coalition Government. Lowe (2007) wrote what others had been saying privately: that CSIRO under former CEO Geoff Garrett during the Howard years developed "a culture of managerialism so wary of offending government, that scientists have been instructed not to comment on issues that have policy implications. Even within universities…there is now increasing pressure to conform" (Lowe, 2007, pp. 60-61), in the face of a disapproving government that controls the purse-strings.

As the organisation was restructured to serve the needs of industry, CSIRO climate change and other environmental researchers arguably came to face a double barrier consisting of a government with a particular policy frame along with critical energy and resource industry "partners", many of whom came to sit on the CSIRO Board and on Cooperative Research Centre (CRC) and flagship boards, as detailed by Pearse (2007). Former Atmospheric Research Division Chief Graeme Pearman says that the defined role of the CSIRO changed and became a directive "to build wealth" at the expense of sharing with society the outcomes of public good research (G. Pearman, thesis interview, June, 2006). Long-time science journalist Peter Pockley agreed. "A policy line is set, often on the basis of ideology or whim, and science is effectively urged to get on board the policy bandwagon…it has taken four reports and 15 years to say what people like Graeme Pearman were saying in 1990" (Pockley, 2007, p. 31). John Williams, former chief of CSIRO Land and Water, is quoted in the same 2007 article as saying: "we must get around the view that there is a clear definition between science

and policy. It's nonsense to say that presentation of scientific information is a form of advocacy which must be avoided".

In terms of communication, notes Lowe, the long-term effect has been that those who agree with the government policy position feel free to speak out while those who know better are intimidated into silence (Lowe 2007, p. 61). In a retelling of the organisational trouble encountered by Graeme Pearman by 2004 while still a prominent member of CSIRO Atmospheric Research, Lowe quotes Pearman explaining the dilemma he was faced with:

> As a climate scientist, I might inform [media] that the lifetime of carbon dioxide in the atmosphere means that the only way of stabilising global climate is by reducing emissions by 50 per cent by 2050 and by 80 per cent by 2100. In the current environment, that is seen as commenting on government policy of not setting reduction targets. (Lowe 2007, p. 63)

In 2004, a report was released by the Climate Group, a business scientific alliance, convened by the insurance company IAG and the World Wide Fund for Nature in 2004 that involved Pearman for scientific advice as well as some of Australia's major corporations outside the mining and resource sector. The report synthesised evidence that climate change was starting to affect Australia (Lowe, 2007, p. 62). A 2006 Australian Broadcasting Corporation Four Corners television program, *The Greenhouse Mafia*, reported that Pearman came under CSIRO administrative pressure as a result of his work with the Climate Group. In the television program, reporter Janine Cohen asked, "Talking about the need for a reduction in emissions and how much would be a safe level, is that really government policy? Isn't it about good science?" Graeme Pearman said, "Well, I believe it is … for 30 years all I've tried to do is convey to the community and to sectors of the community what good science suggests is the way forward" (Cohen, 2006, transcript, p. 7).

Pearman says he was subsequently made redundant by the CSIRO, in the Division he had led as Chief from 1992-2002 (G. Pearman, thesis interview, June 2006). In context, his communication work, together with that of scientific colleagues with the seminal greenhouse conferences in 1987 and 1988 and certainty in public communication thereafter, played a significant role in the early good public understanding of anthropogenic climate change.

Graeme Pearman, his colleague Barrie Pittock and also Ian Lowe stand out as Australian scientists who withstood the pressure from the mid-1990s into the 2000s and continued to speak out clearly and publicly about the risks of climate change.

Another public sector scientist told this thesis enquiry in an informal interview of dealing with the federal bureaucracy during the study period. He said analyses he was contracted to produce for the federal government on the likely environmental impacts of population growth were never published because, he believes, they did not give the desired answers in line with population growth policies. A detailed account of this 1990s collision between science and official immigration policy can be found in Lowe, 2007, pp. 65-70. Lowe also raises the difficulties encountered by renewable energy researchers, who feared loss of funding if they spoke out on government policy regarding the Australian energy sector.

These communication restrictions accompanied a more fundamental redrawing during the late 1990s under the Howard government of what constitutes "the public interest". Research into renewable energy, integrated pest management, tropical rainforests and the Great Barrier Reef was defunded (Lowe, 2007) along with the wind-down of the former CSIRO Division of Wildlife and Ecology and eventually Land and Water. The federal government instead redirected funding into commercial pursuits including research for the coal industry. "By steering research funds away from activities promoting the public interest, the government has replaced the concept of the public interest with an economistic view, equating the good of the private sector with the good of the community" (Lowe, 2007, p.71). This is entirely consistent with the ideology of economic rationalism as explored in Chapter 6 and further illustrates the wide-ranging influence of this ideology on public policies and discourses in Australia in the past 10-15 years.

CONCLUSION

The evidence from the documentary record supports the analysis that communication of anthropogenic climate change and related public understanding hinged considerably on the framing of certainty/uncertainty during the study period.

Science history shows uncertainty arguments and demands for technical, quantitative measurements have been used against environmental research findings since at least the publication of Rachel Carson's seminal *Silent Spring* in 1962 on the effect of pesticides in the environment. Similar arguments provoked lengthy delay in policy action in regard to the hole in the ozone layer in the 1970s. Invoking uncertainty or demanding certainty can be a deliberate strategy or a misunderstanding of how science operates.

In regard to anthropogenic climate change, there is a compelling body of evidence supporting the mainstream scientific conclusions—including the need for effective risk management—without 100 percent "proof", because that is the nature of scientific discovery. However, that can be framed as insufficient. This is a challenge for emerging phenomena that defy simple on-ground measurement. On the other hand, as early as the 1960s in the United States, policy-makers have shown themselves capable of rejecting these uncertainty arguments in favour of risk management and precaution.

A precautionary policy response to science messages on climate change occurred in Australia in the early study period at a time when on-ground data were still emerging—i.e. were less well-measured than later. Communication of certainty about the key elements of the phenomenon, in the 1990 IPCC report and other scientific communication, as well as in government documents and newspaper reports at the time, happened concurrently with the positive policy response. It is therefore reasonable to suggest that certainty influenced policy.

Thereafter, with changed political leadership and a different policy agenda, a growing "debate" was generated not only about response but about the previously accepted science—rapidly amplified by the business press and eventually by the general-interest

broadsheet analysed. This was characterised by attempts to "balance" the science with contrarian views, not seen in the newspaper analysis from the early 1990s. The same newspaper analysis also showed a marked rise in opinion articles by 2001 on either side of the issue and science updates placed in the opinion features, effectively underscoring debate and uncertainty. The contributions of sceptic scientists, think tanks and corporate opponents in encouraging uncertainty were considered in chapter 8.

An important influence on the framing of uncertainty in the discourse was a public retreat by scientists after the early 1990s to the conventional scientific language of uncertainty both out of habit and arguably as a defensive posture in the face of the attacks on the science and on climate scientists. In this chapter I show that the plain-English 1990 IPCC summary for policy-makers, was followed in later years by IPCC assessment summaries that highlighted degrees of uncertainty and reverted to technical jargon from the various disciplines involved in the assessments. It is suggested the more hedged and conventional scientific style was not well understood by the media, politicians and other lay audiences.

Characterising the science as uncertain in public communication became the dominant frame by the late 1990s, regardless of the consistent nature of the baseline risk messages and research findings. The impression of the public arguably became: scientists can't agree and proof is lacking. The impression of uncertainty helped boost the legitimacy of a reframed policy agenda favoured minimal response in support of a status quo mining and energy industry economy. The uncertainty frame was also fed by feuding bureaucracies representing environment and industry/trade, and media executives subject to persistent corporate complainants when reports linked climate change to on-ground weather impacts that the public could experience. Possibly contributing to confusion was the media habit to report the research on anthropogenic causes as newly discovered with later IPCC report (1995, 2001)—although this was first established in 1990.

In this chapter I also briefly examine the evidence that climate change and other environmental scientists were effectively silenced or "gagged" by the late 1990s and thereafter from publicly contributing research findings that might be seen as contrary to

official policy, be that on the need for emission reduction targets or on population numbers. The concurrent demise of "public interest" science in Australia invites separate and further investigation.

Combined, the various communication paths to framing uncertainty may well have resulted in a level of public confusion that paralysed further calls for action. This can be seen as deliberately or incidentally consistent with the public relations position that an uncertain public will not demand action on climate change (Luntz, 2003).

CHAPTER TEN

ROLLING THE CLIMATE DICE: FRAMES, VALUES AND NARRATIVES IN AUSTRALIA 1987–2001, SUMMARY FINDINGS AND DISCUSSION

KEY FINDINGS

Some major findings from the public documentary record together with interviews investigated for this thesis are as follows.

1. The scientific message about anthropogenic climate change stayed remarkably consistent during the study period from 1987-2001. Briefly recapped, it states that a phenomenon called the enhanced greenhouse effect has been identified for some time in the atmosphere around the earth. The increase of greenhouse gases (water vapour, carbon dioxide, oxides of nitrogen, ozone and methane) in the atmosphere causes incremental average warming of the planet thereby threatening a range of severe climatic disturbances (still being explored). In historic times the enhanced greenhouse effect is linked to human activity—primarily emissions from burning fossil fuels, but also emissions from agriculture and deforestation. If not mitigated by drastic cuts in greenhouse gas emissions from industrial activities and by slowing the rate of vegetation clearance (a sink for greenhouse gases) along with vegetation replacement, the climatic disturbances of drought, fire, flood, severe storms and sea level rise could become catastrophic for human populations and other species.

2. Research of the public record, including newspaper reports and government documents, found that during the early study period (1987–1991) Australian public awareness and public knowledge about climate change were high. Scientists used direct and certain language and were often quoted (without debate from sceptics). Political leaders were preparing for action with a greenhouse gas emission reduction target of stabilising greenhouse gas emissions at 1988 levels by 2000 and reducing them by 20 percent from that level by 2005. Response options, starting with energy efficiencies and renewable energy options were extensively explored and related research was funded. Some regulation was considered acceptable and necessary. The early good public understanding correlated strongly with unequivocal language signalling certainty in the first, 1990, IPCC assessment reports, no public debate about human agency which was

repeatedly reported as a major cause, empirical evidence in the form of severe weather, and a science/risk management (rather than a political/economic) focus to news reporting.

3. The dominant political/media narrative shifted gradually but radically after 1991. The shift was away from acknowledgement of mainstream risk posed by global warming/anthropogenic climate change, as the greenhouse effect came to be known, and away from the narrative that response required a global citizenship value set while offering domestic opportunity for new industries and cost saving. The shift was to a dominant narrative of national self interest, said to be threatened by outside forces like the United Nations and the national interest was identified with industries that extract and/or rely on fossil fuels, notably coal. The economic modelling of cost to mainstream Australia of change to status quo energy industries—without addressing a balancing benefit to society —helped to successfully marginalise the ongoing narrative of risk from green groups and scientists. This was now framed as counter to the national interest. Any action had to be voluntary, cost-neutral and market-focused.

4. This reframing of the dominant narrative reflected a shift from an evidence-based, science-informed discourse of Australia's national self-interest, options and responsibilities, to a primarily normative economic discourse of how things *should be* for Australia— amplified in media and policy documents.

5. Separate analysis of influences on the dominant narrative and its shift during the 1990s revealed that public communication on this topic closely reflected shifts in dominant beliefs, values and elite agendas. Specifically, I looked at the values and agenda of an economic rationalist ideology that took on hegemonic proportions in Australian society during the study period. I examined the economic value shift in the wider context of societal "no limits" beliefs in growth and progress, techno-fix solutions and human exceptionalism. Values and beliefs were reflected in rhetorical framing which can be studied from the public documentary record—news and feature reports and government and industry documents. The reframe from ethical, risk management and globally responsible policy positions and a corresponding dominant narrative in response to climate science to a narrative emphasizing scepticism and national self interest synonymous with no change from "business as usual" happened regardless of the underlying science, which did not shift. The reframed narrative was communicated

by value-laden (jobs, family, "us and them" rhetoric) which I examined with the assistance of theory from cognitive linguistics.

A related finding is that communication narrative and public discourse shifts strongly correlated with changes in national leadership style, more so than with changes in political parties and that early positive climate change response was non-partisan at federal and state levels. Changed public communication from political leaders strongly correlated with vocal opposition to climate change action, or even acceptance that climate change is real, coming from elite business groups and market-oriented think tanks as the study period progressed through the 1990s. Similar results can be identified at the level of state politics and response, e.g. ideological and leadership changes in Victoria were notable after 1991 with the effect that the state's early leadership on climate change response, such as comprehensive energy efficiency strategies, came to a standstill. State politics have not been a focus of this enquiry but offer enlightening case studies, given the state control of energy production and also land-use management that are linked to levels of greenhouse gas emissions.

6. This enquiry found much evidence to support the hypothesis that politicians and the media are the co-agenda setters of the dominant narratives in the public discourse, consistent with the theory of agenda-setting but contrary to any proposition that the media alone frames science stories. A framing lens was developed and applied to the documentary evidence to analyse the differences in communication over time. By the mid 1990s the two major newspapers studied (with the exception of some science and environment reporters) amplified and did not counter the dominant narrative changes towards debate and uncertainty, in regard to response but increasingly also in regard to the science, coming from national policymakers. This was in contrast to the early study period (1987-1992) when the same mass media had relayed risk messages from scientists and positive policy responses in a language of certainty. By the mid 1990s the majority of media stories had shifted from a science to a political focus (along with the "national interest" economic focus). Political journalists became the dominant interpreters of the climate change story and they followed the changing political narrative, without much evidence that they contextualised with the science and the risks. This study agrees with the suggestion in the literature that while that mass media and politicians are co-agenda setters of the national discourse, sometimes one sector is leading the way.

This can be seen by the shifts in reporting, evident from the newspaper record, from the early to the later study period. When political leaders and scientists were in agreement on the risks and response options regarding climate change, the media reported it as matter-of-fact news. Later, under different leadership and hardening market ideology, newspaper articles helped reframe the story for public consumption, – regardless of the consistency of the scientific risk messages from early to late study period and the fact that science reporters, outside the business press, continued to report those messages. The impression left with audiences was arguably confusion and uncertainty.

Internal structural features of the media, aided by the highly concentrated nature of Australian media ownership and a culture of short-term interest, by the later 1990s led to a response of "balancing" the climate change "debate" which helped cement a climate of uncertainty about the science. Media concentration was a meaningful influence. The prime example in Australia is that of a major multinational owner, News Limited, which owns more than 70% of the nation's print media. The company took a sceptical editorial stance during the study period and played a leading role in reflecting the economic rationalist ideology overtaking Australia—in turn the foundation for the normative economic narrative of the mid to late 1990s.

7. Media debate was aided by the emerging public role, encouraged at times by think tanks and corporations, of sceptic scientists, many of whom are geologists, climatologists and meteorologists. Regardless of what the titles imply to the lay public, these disciplines are not synonymous with climate change specialist. An analysis of the disciplinary beliefs of geologists and the other two professions in the second half of the 20th century gives some insight into why these professions are prominent amongst the public sceptics: they share doubt about the validity of computer modelling of future climate impacts (but, according to the evidence, may not extend that doubt to economic modelling). They may have entered the debate with strong disciplinary beliefs that the past always predicts the future and that meaningful evidence must be measurable on the ground. A US Congressional committee found public sceptics routinely played outside the system by not publishing for peer review, by abusing scientific conventions of courtesy and democracy and by mixing fact and opinion or policy recommendations in their statements. Media conventions of conflating all scientists to equal status of expertise ("scientists say") aided the sceptics and further confused the discussion.

8. An analysis of the influence of communicating scientific certainty and uncertainty found both to be closely correlated with levels of public knowledge and with the substance of policy response. A shift from early to mid study period was documented in terms of climate scientists' own use of language—e.g. a shift from plain English certain "this is happening" to uncertain "this is xxx percent likely" . Scientists' professional acceptance of uncertainty and the fact that there is never 100% proof in science did not translate well to politicians, particularly sceptical ones, reporters and other lay people who were liable to hear "we don't know" or "we can't agree". Some climate scientists working with the IPCC during the study period link the shift in language of certainty to a reaction against increasingly vocal sceptic activity and hostile debate generated in part by multinational energy and auto companies at the international level as well as challenges to Australian climate scientists. Another interpretation is that the shift was a natural reversion to a more comfortable level of scientific communication highlighting uncertainties.

Characteristics included a reversion to professional jargon; a posture of objective neutrality; and, a retreat from explaining implications that might be seen as prescribing policy. My analysis showed that the IPCC reports reflected this change to the more technical and less reader-friendly in the 1995 and 2001 assessments. A major US review of government scientists showed that encouraging the technical, obscure and difficult in scientific reports to the public and media has been one tactic by governments to generate delay, disinterest and inaction.

9. I looked briefly at the influence of policies to corporatise Australia's public science agencies and to diminish public interest research during the study period—a perspective that deserves more indepth study. The evidence indicates that the corporate restructuring, along with an increasing government mandate for industry-related research and internal guidelines discouraging scientists' from addressing policy issues, all had a chilling effect on climate scientists' and alternative energy researchers' freedom to communicate publicly.

10. Looking more closely at the language and framing of the changed dominant narrative from "can do" towards "can't do" regarding emission reduction that evolved by the later 1990s, I noted that much political and media communication closely

resembled public relations advice on how to manufacture uncertainty and persuade audiences in order to negate public calls for action on climate change. The understanding of how this is done rhetorically can be gained from cognitive research—of how audiences hear messages and thus how to manipulate audiences' emotional core values with rhetoric and metaphors about nation, family, jobs—in order to maintain the status quo. Documented public relations advice recommended that uncertainty and the belief that "scientists don't agree" would suffice to stop the public from demanding action on climate change.

CONCLUSION AND DISCUSSION

Deconstruction of Public Knowledge as Science Communication is Reframed

The hypothesis that emerged from the results—consistent with grounded theory—is that public knowledge can change dramatically over a short timeframe, reflecting shifts in dominant social values and delivered by narrative communication frames. Gradually established from the early 1990s in Australia by politicians and the media as co-agenda setters, the changed framing on climate change became increasingly uniform by mid-decade, rarely disturbed by competing messages from domestic scientists.

Political and cultural "hegemony" is a theoretical term that well describes the spread throughout Australian society of the tenets of economic rationalism that proved hostile to the global, urgent, risk management response to anthropogenic climate change that characterised the late 1980s into the early 1990s. A reframed narrative and related public language became consistent across politics, media, and other aspects of public life from the mid 1990s to the 2000s.

The new narrative accepted by audiences was that domestic action to lower emissions was linked to job loss and severe economic penalties for average Australian families with any change to the energy production status quo. The revised narrative focused on Australia's special place in the world—a claimed exceptionalism based on Australia's historic role as an export quarry of natural resource. After 1996, the national political narrative, amplified by the media, held that economic decisions to become the world's largest coal producer for export and for cheap electricity at home (which had helped

elevate the Australian standard of living) meant it was in the interests of Australian families to delay on tackling related greenhouse gas emissions—*if* climate change was even linked to emissions from burning of fossil fuels, which this narrative also debated.

The evidence shows that the interaction of beliefs and values in the leading policy sectors and in media, and the co-agenda-setting role of these institutions, are major keys to understanding the science and society framing of climate change communication in Australia. A public climate of uncertainty supporting a lack of effective policy response to climate change was the outcome for almost 20 years.

Major Influences on a Climate of Uncertainty

I looked at three areas of influence on the dominant narrative during the study period. These were cultural values and ideologies, the mainstream media and its structural features, and disciplinary differences and values within science and their effect on the expression of scepticism, as well as other drivers of sceptic communication including energy corporations and free market think tanks. These influences came together to support the parallel rise of uncertain language from the climate change specialist scientists and communication signalling uncertainty from politicians and media as discussed in chapter 9. The power of uncertainty can be judged in the context of public relations understanding. One prominent US public relations adviser counselled politicians that fostering uncertainty, specifically on climate change, would be enough to stop action.

The combined result on public understanding was that lay audiences including politicians, reporters and citizens came to treat the science as debatable opinion creating an impression that "scientists don't agree", despite the fact that research showed this impression to be inaccurate and that instead agreement within the key disciplines was at a level of about 99-1, judging from publications in the mainstream climate change literature. However these comparisons were apparently not reaching or persuading the public.

The ideology of free market economics became a major influence at all levels of public discourse during the 1990s and also affected the ability of scientists to contribute to the discourse as public interest research was diminished in the later study period. Federal

budget cuts from 1996 affected research programs that earlier promised response strategies (such as solar thermal, fuel efficient or electric motors, bio-gas etc). The culture changed to favour an anti-regulatory, voluntary and private-enterprise slant to every potential response, and the public came to accept this as normal or reality.

The results of my research suggest that additional influences on the changed dominant narrative of the 1990s were: a lack of positive leadership embracing action compared to 1987–1991; the use and misuse of scientific uncertainty—both strategically and in scientific argumentation; a media increasingly dominated by political reporting and applying internal strategies including increasing numbers of "balanced" opinion articles, as well as often omitting context or using it to introduce sceptics; and, the marginalisation of environmental groups and scientists. These influences were receptive to an assault on the science by the mid 1990s, with intellectual arguments supplied by a small cohort of non-mainstream scientific sceptics, and by free-market think tanks heavily supported by the resources sector, resulting in a national message of delay and uncertainty. This suited the "business as usual" interests of the resource industry and energy sectors, as amply documented by other researchers and supported by the evidence gathered here.

The conclusions of this enquiry take issue with any belief in the scientific community that more and better information alone will lead to rational action. Instead it was found that—after the early period of good public knowledge spurred by clear scientific communication, clear media reports and supportive national political leadership—changing national leadership and certain social constructs of belief and values had a stronger impact on policy and political outcomes and, through communication, on public understanding than the scientific input.

The driving values of agenda-setting elites and much of the general public in the study timeframe can be grouped under "no limits" beliefs—including assumptions about progress, growth and the benefit of developing natural resources (one belief set is that they are limitless) allied with beliefs in a saviour "techno-fix" and deeply-held beliefs in human or Christian exceptionalism. The renewed emphasis on these (traditional for Australia) values under economic rationalist government policies are explored in detail in chapter 6. The hypothesis is that they strongly reasserted themselves after the early study period, forming the basis of the ideology of 1990s hegemonic culture. This

conclusion is also supported in earlier work by British geographer Harriet Bulkeley who found that the traditional values reasserted themselves in short order after the late 1980s in Australia.

How to achieve cultural hegemony of values was also indicated from surveying internal media structural features. One documented method was the stacking of media companies' boards of directors with ideologically like-minded individuals. Values also adhered to editorial policies, with politics and economics at the top and environment and science somewhere near the bottom. Together, politicians and their economic advisers and media workers specialising in politics and economics, e.g. the Canberra press gallery (along with some media owners) were the agents that primarily deconstructed the early good public understanding and political will to act.

Looking at media coverage specifically from the documentary record and through interviews, it appears that after the early knowledge of the science displayed in news accounts of 1987-1991, the editorial decision-makers during the 1990s became disinterested, ill-informed or ideologically bound and they were also under pressure from the corporate sector. The shift of the climate change story to political reporting did not help shed light on the scientific facts and political reporters were open to factual distortions because they did not know better. Opinion overrode fact in commentary by newspaper columnists. Columnists, think tank publications and talk-back radio hosts lambasted climate scientists as being self-serving seekers of research grants. While science and technology reporters did continue throughout the study period to retell and update the original science story of risk much as they had in the early study period, their voices became outnumbered in aggregate by political reporting and sceptical opinions.

It is likely that reporting with both certainty and scepticism in the same time frame simply led to public confusion. It may also encourage the response that science communication can be heard according to what an audience believes or wants to hear. The establishment of the internet during this period arguably played a role in the longevity of some of the critical debates and erroneous scientific arguments that audiences could chose to hear. The influence of the internet during the study period merits further investigation in regard to fostering a belief-driven communication environment.

While the traditional "no limits" and developmentalist values and beliefs have been a strong part of Australian culture for most of the country's existence, it is shown that in the late 1980s these traditional values were mitigated by the mainstreaming of environmental concerns under the inclusive national leadership style of Prime Minister Bob Hawke (which ended in 1991). Beliefs and values (aligned with leadership) thus arguably are major keys to understanding the influences and barriers on climate change communication as it developed up to the present.

Lessons from the Early Study Period and a Historical Context

One of the most novel findings of this enquiry is the extent and depth of political/public knowledge during 1987-1991 that led to an early (interim) emission reduction planning target in October 1990—a more ambitious and coordinated response to the scientific message of risk than anything devised since. The response involved formal commitments at federal and state levels to a suite of policies that would have overhauled principally the energy demand and supply equation in Australia to minimise polluting greenhouse gases. In the first instance, it was proposed to do this through efficiency measures in the household, commercial and industrial sectors.

Newspaper reports at the time pointed out that Australia made very inefficient use of fossil-fuel based energy compared with similar industrialised nations. Vehicle emissions and appliance labelling were both within the federal government's portfolio. It was understood that a key response would be to hold down demand for more energy and commentators at the time took it for granted that significant "demand management" might require regulation (or to use the free market jargon "intervention"). However, any form of market regulation was anathema to the influential free market economists within the federal government during the 1990s.

Four phenomena stand out from the early period of the study (1987-1991)—and may offer an enduring message for communicators: scientists gave a clear message in unambiguous language that did not focus on uncertainties; politicians provided leadership and supported the science message; environment was accorded a mainstream role in politics and in the public discourse, which also meant that climate change risk was framed as affecting everyone and as not a sectoral "green" issue; and, media

reflected and sometimes drove the agenda in congruence with the values of the political elites but also respecting the scientific message.

Media analyses—primarily from the USA—support the finding of this thesis that scientists were the primary sources of information in the early days of media reporting on climate change i.e. the late 1980s and early 1990s but that politicians and interest groups (both industry and environmental) became more prominent sources as the decade wore on (e.g. Corbett & Durfee, 2004). The present study shows a marked shift in media sources occurred in Australia, depending on the publication—e.g. industry perspectives allied with national politicians became very predominant in the business press (compared with earlier neutral or even critical industry coverage) but industry was not prominent in the general daily broadsheet, while politicians were frequently quoted throughout the study period. Environmental groups played a greater spokesperson role in both publications as the decade unfolded.

An analysis of the general interest daily newspaper also showed a significant shift to opinion as information source by the end of the decade. The number of opinion pieces on climate change in *The Sydney Morning Herald* had gone up tenfold by 2001 from a level close to zero in 1988–1989

Language and Rhetoric

This thesis analysed and compared the communication language and rhetoric employed during the period of early understanding with the re-framing that took place during the 1990s. The later rhetoric not only publicly re-asserted traditional values, but moved away from ideas on moral leadership and global responsibilities to a more inward-focused, nationalistic discourse on climate change. The revised rhetoric was commonly used by think tank publications and related newspaper columnists and a generation of like-minded market economists and political leaders in general agreement with extractive and energy industry perspectives.

Framing analysis, based on cognitive linguistics theory supported by insights from propaganda studies and public relations advice, shows how use of language can elicit a favourable response to "no change" and "can't do" policies. The rhetoric used metaphorical frames that appeal to core values like home, family, nation and jobs. These

were identified with the national interest and Australia's exceptionalism. "Us and them" became the subtext. In the lead-up to the Kyoto Protocol summit in 1997 and later as ratification loomed in the early 2000s, the rhetoric suggested that outside interests were seeking to interfere with the Australia's national interest and prosperity. The rhetoric implied that "them"—the United Nations, Europeans and green groups—were seeking unfair emission reduction targets that would hurt mainstream workers and families.

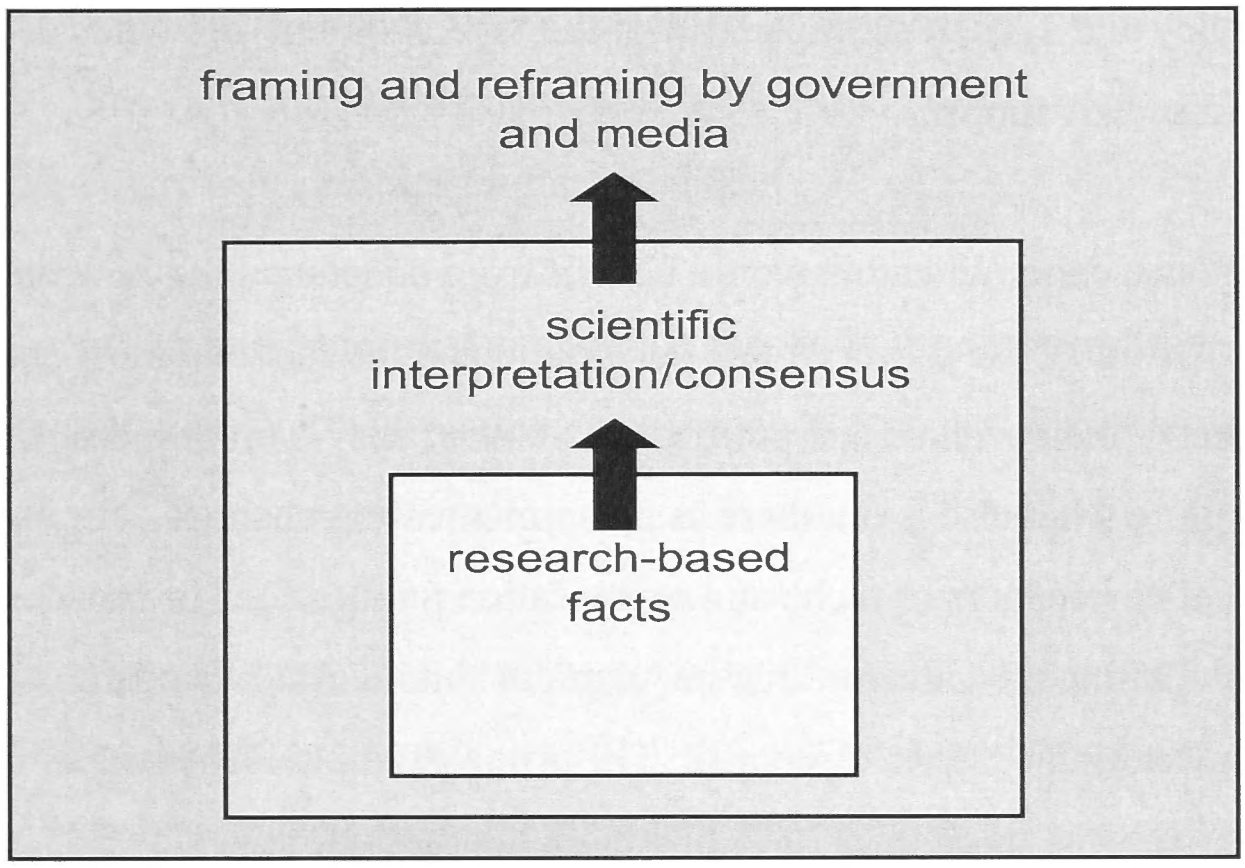
Controversial Science, Understanding Agendas and Framing

In summary, this longitudinal thesis investigation of climate change communication and framing in Australia suggests that environmental science, when it might be controversial, may best be communicated with a strategic understanding of contemporary social and cultural influences—particular the joint agenda-setting and framing roles of political leaders and the media. A useful tool is an understanding of how rhetorical framing is constructed, what values are being spoken to, and what audiences are likely to "hear".

This investigation also highlights the contribution of an historical context that afforded a comparative review of the daily narratives that shape "reality" for audiences and direct what society does. If we accept that we live in a time where humans have unprecedented if unguided control over planetary systems, then what we do to our environment is a function of what we think is reality. And what we think changes: it is guided by the values, agendas and rhetoric communicated by opinion leaders in our society. Ultimately, what we think will affect the future climate.

The conclusion of this study is that public knowledge of anthropogenic climate change was successfully re-constructed and re-framed during the 1990s from a baseline of good understanding in 1987-1990. In this way one can argue that reality, as conveyed by scientific discovery, can be reinterpreted or changed in public discourse even as the scientific data scarcely change over time.

Science messages re-framed outside of science



From the results and conclusions I have extracted a list of possibly useful implications for communicators of controversial and environmental science.

IMPLICATIONS FOR SCIENCE COMMUNICATION AND FOR FURTHER RESEARCH

This thesis offers some implications for communicating controversial science and society research findings, specifically climate change.

Scientists need to be aware of what audiences "hear" when they speak of uncertainties in their findings—it's usually not the same as their own scientific convention of uncertainty. A very contemporary example comes from an ABC radio report in March 2011. The interview was with Australian Conservation Foundation President Ian Lowe who said that there is uncertainty still in climate science but it is in regard to the severity of likely impacts which may have been underestimated: his point being that things could get much worse than predicted. The reporter led into the story saying: "Scientists are still uncertain about climate change" (full stop). That is what he heard. The lesson

therefore is to reconsider the urge to use stock phrases and consider what is likely to be heard as "controversial" and picked out for that reason.

Science communicators should take into account what is happening in the real world of policy and agenda-setting and who the "stakeholders" are when dealing with science and society topics.

Science communicators would benefit from understanding how the mass media operates in Australia, the power of talk back radio and the fact that most people probably now receive their science and political news from television or radio. Communicators might explore what else is out there as a communication channel—for example independent local newspapers or niche and organisation publications or broadcasts. The extreme level of media concentration in Australia should also be understood along with its impact on the public discourse. The prime example for Australia is News Limited, which owns more than 70 % of Australian metropolitan newspapers and *The Australian*. For example, if communicating climate change research findings it is helpful to know that these publications have not been editorially neutral on the science and if/how to reduce emissions. That can change and knowing the editorial stance is part of the equation. The issue for a science communicator is how a press release or information is liable to be used under such circumstances and how to gain the most factually correct outcome.

Editors have considerable influence. This is exerted by story inclusion, placement and headlines. Science communicators may find their story is not used in a way that reflects the research outcomes. Editorial antipathy or indifference was described by science or environmental journalists who tried to keep the climate change story alive during the 1990s.

A related lesson is that political and economic stories are generally considered priorities by the media hierarchy and by politicians—together they set the daily agenda of what is news. Therefore the parliamentary press gallery is often interpreting climate change or other environmental or science issues without the specialised background that would benefit their communication. Conflict and controversy are the bread and butter of political journalism, and that is where climate change has landed. The way out of this dead-end in Australia is not clear cut.

Talk-back radio is arguably under-used by scientists/science communicators but should be recognised as a potent tool for setting the daily news agenda and is used in that way by politicians. In regard to climate change communication the challenge is that most talk-back radio hosts in Australia are hostile to the concept of anthropogenic climate change and more readily interview sceptics (documented by an ABC *Mediawatch* program in 2011). Other controversial topics might fare better.

The internet is another confounding factor that emerged in the study timeframe of this thesis. It offers many communication opportunities but also much potential for creating confusion and doubt.

Framing climate change information in ways that many audiences understand—harm or risk minimisation, insurance, health and family benefits—reflects an understanding of what diverse audiences may have in common and what they hear in a positive or neutral light. This may be attacked as spin by some scientists but the challenge for them is to get beyond the information deficit trap of repeating similar information in "science-speak" that includes very often the scientific concept of uncertainty. The information could, for example, instead be translated into an insurance framework that includes probabilities.

One of the best analogies I have personally heard for climate risk and the current level of scientific certainty came from a businessman who asked: "Would you put your children on a plane with 70–80–90% certainty it would crash? Of course not." Research in 1989 indicated audiences might not expect much more than 50% certainty from scientific findings in order to support action to counter the greenhouse effect. And yet the political discourse in the 2000s was still debating 90% certainty of negative impacts.

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The barrier that looms for communicators is not a lack of facts but rather belief structures and denial. The analysis for this thesis suggests that understanding embedded beliefs affecting an area of environmental research—in the climate change example beliefs are limitless growth and progress, guaranteed techno fix to problems, and human exceptionalism to biological impacts—may help inform more effective communication approaches. While not covered in the thesis, understanding the psychology of cognitive

dissonance and resolution may also be an interesting study: Australia's role as the world's largest coal producer while rhetorically proposing to counter coal-based emissions would be an excellent subject.

Research shows that context aids understanding. A current example would be to include in a discussion of a price on carbon the information that fossil fuel production has never reflected what it really costs: taxpayer subsidies before the market and pollution afterwards that society has to clean up. Another context is the opportunity for new industries to emerge on a level playing field if the old energy economy is no longer subsidised.

Cognitive scientist George Lakoff points out that audiences react according to their self-identity and values, which is what must be addressed— e.g. through group opinion leaders/innovators—for a message to penetrate. It is possible to identify other national discourses that betray a significant value, identity and belief base (that may drive policy rather than peer-reviewed scientific evidence). One example is the different perspectives on the appropriate "management" of kangaroos—treated either as a pest based on long-held rural beliefs and values, as a resource to be "harvested" like trees (or whales), or as a valuable part of Australia's biodiversity and an economic asset in tourism.

A message is heard through a filter of social values—therefore underscoring benefits from climate change action such as: new jobs in new industries, better health, a clean environment and doing something about global warming impacts—might have a greater chance of being heard by diverse audiences than a message about investment security in the energy sector which may primarily interest the industrial sector. Politicians know this but they often overdo a few phrases—jobs (generic without context), Australian hard-working families, etc, to the point of becoming unheard.

The same is true in reverse. The scare campaign around the word "tax" is an excellent example of using emotional triggers to engender a negative response, in a context where tax has been vilified as bad for a decade and more.

Language choice is important partly because repeating rhetoric and frames reinforces the messages of those who set an agenda. This has been very apparent from the public discourse on climate change in Australia which for a decade and longer was hijacked to

talk only of costs and not of benefits of early action or the opportunities of new industries. The message for communicators regards active versus reactive communication.

In this context it helps to understand the ideological underpinnings of the political economy. There is nothing fundamentally true about the message that "tax is bad". Rather, it reflects the ideology of economic rationalism which took root in Australia during the 1990s. It reflects the ideology that the government, which might receive a tax, is incapable of efficient action on behalf of society. This ideology is also against government regulation.

Another example of helpful context in regard to the dominant narrative since the early 1990s on acceptable government responses, is that regulation has been ruled out for similar ideological reasons. This was not the case in the late 1980s, thus indicating this is a normative assumption that has been communicated as reality. This thesis found the emphasis on voluntarism and individual behavioural change stems from this recent version of reality. To seek historical context may broaden options for effective communication.

Communicators on controversial topics can also benefit from contextualising where opposition is coming from and what disciplinary values a critic holds. For example, with climate change sceptics, it is helpful to be able to identify the values of older geologists and meteorologists, or economists and suggest that arguments may be specific to the training, values and assumptions of the speaker. Other sceptics may have ties to think tanks or corporation and that too is useful context for an audience.

In summary—the implications are to be proactive not reactive; carefully consider language, framing and what audiences hear; understand the media and choices for communication avenues and repeat messages employing evidence-based context, not controversy.

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APPENDICES

Appendix 1

Text/documentary evidence

Newsweek cover March 2 1987

1985 Villach statement

Australian and New Zealand Environment and Conservation Council (ANZECC) — Programs Implemented and Policies Adopted since 1988 that Contribute to Reducing Greenhouse Gas Emissions in Australia, cover and foreword (i), October 1991

Planning Ministers' Greenhouse seminar in Cairns June 1990

Australian Financial Review article, 7 March 1990, Stuchbury

The Sydney Morning Herald, 5 June 1990 article, Cleary

The Sydney Morning Herald, 8 July 1996, Gilchrist

Additional titles of documentary evidence sampled

Appendix 2

Invitation to participate and consent form

Interview transcript, J Kerin

BOX 32
DOC 520

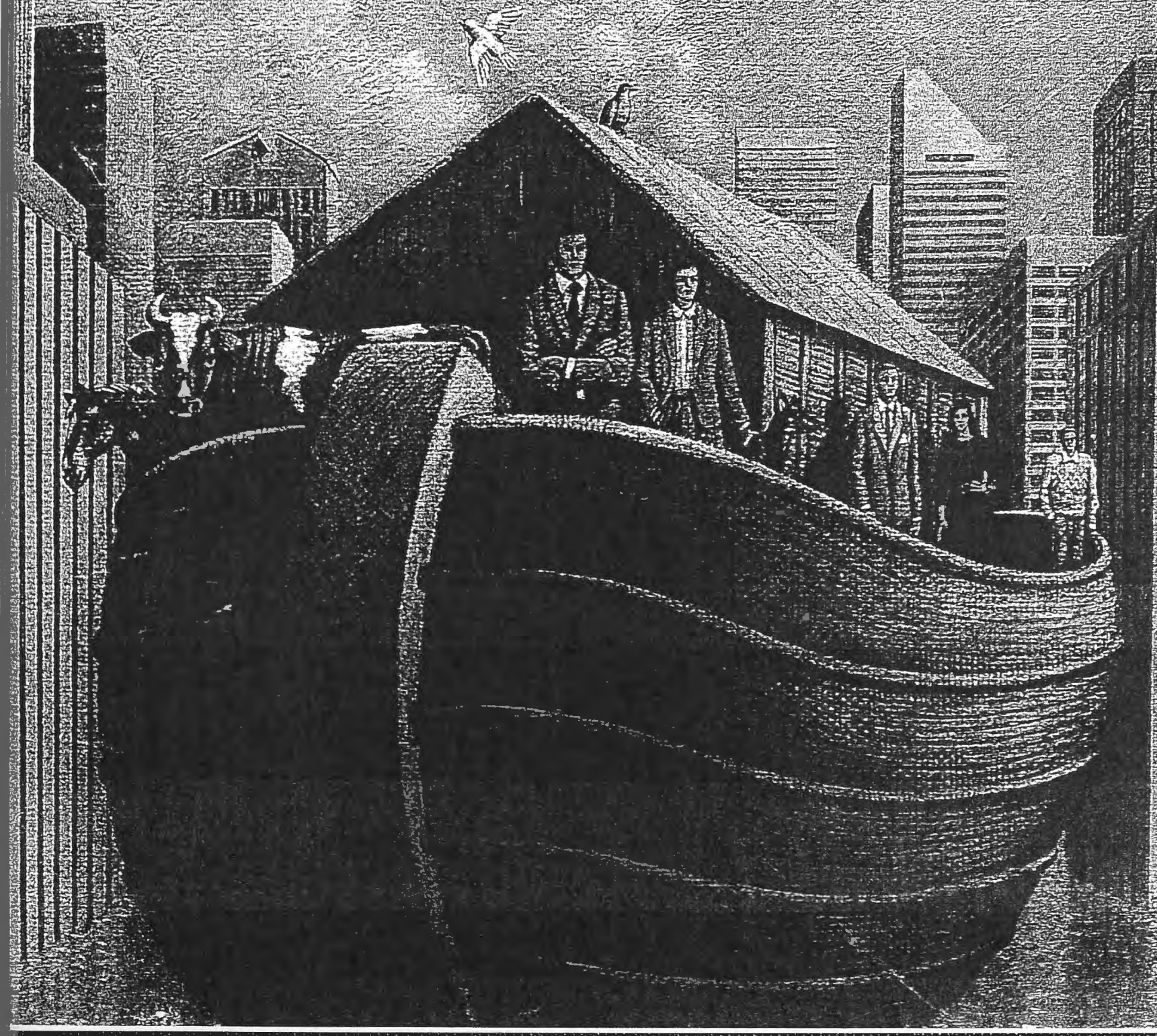
GORBACHEV'S CHALLENGE
By Henry A. Kissinger

ewsweek®

ONAL NEWSMAGAZINE

Mother Nature's Revenge

The 'Greenhouse Effect' and Ozone Depletion Threaten Major Changes in Our Health and Climate



Austria	36 Sch
Belgium	95 BF
Denmark	16.00 Kr
Finland	11.00 Mk
France	15.00 F
Germany	4.60 DM
Gibraltar	1.20 £
Greece	250 Drs
Iceland (incl. tax)	80.00 IKr
Ireland (incl. tax)	1.40 I£
Israel	3.00 NIS
Italy	3000 L
Luxembourg	95 LF
Netherlands	5.00 Fl
Norway	15.00 Kr
Portugal	250 Esc
S. Africa	3.25 rand
Spain	275 ptas
Sweden	15.00 SKr
Switzerland	4.00 SF
United Kingdom	1.20 £

APPENDIX 1

1985 Villach conference statement

SCOPE 29 - The Greenhouse Effect, Climatic Change, and Ecosystems

Statement by the UNEP/WMO/ICSU International Conference on

THE ASSESSMENT OF THE ROLE OF CARBON DIOXIDE AND OF OTHER GREENHOUSE GASES IN CLIMATE VARIATIONS AND ASSOCIATED IMPACTS VILLACH, AUSTRIA, 9-15 OCTOBER 1985

A joint UNEP/WMO/ICSU Conference was convened in Villach (Austria) from 9 to 15 October 1985, with scientists from twenty nine developed and developing countries, to assess the role of increased carbon dioxide and other radiatively active constituents of the atmosphere (collectively known as greenhouse gases and aerosols) on climate changes and associated impacts. The other greenhouse gases reinforce and accelerate the impact due to CO_2 alone. As a result of the increasing concentrations of greenhouse gases, it is now believed that in the first half of the next century a rise of global mean temperature could occur which is greater than any in man's history.

The Conference reached the following conclusions and recommendations:

1. Many important economic and social decisions are being made today on long-term projectsmajor water resource management activities such as irrigation and hydro-power, drought relief, agricultural land use, structural designs and coastal engineering projects, and energy planningall based on the assumption that past climatic data, without modification, are a reliable guide to the future. This is no longer a good assumption since the increasing concentrations of greenhouse gases are expected to cause a significant warming of the global climate in the next century. It is a matter of urgency to refine estimates of future climate conditions to improve these decisions.
2. Climate change and sea level rises due to greenhouse gases are closely linked with other major environmental issues, such as acid deposition and threats to the Earth's ozone shield, mostly due to changes in the composition of the atmosphere by man's activities. Reduction of coal and oil use and energy conservation undertaken to reduce acid deposition will also reduce emissions of greenhouse gases, a reduction in the release of chloro-fluorocarbons (CFCs) will help protect the ozone layer and will also slow the rate of climate change.
3. While some warming of climate now appears inevitable due to past actions, the rate and degree of future warming could be profoundly affected by governmental policies on energy conservation, use of fossil fuels, and the emission of some greenhouse gases.

These conclusions are based on the following consensus of current basic scientific understanding:

- The amounts of some trace gases in the troposphere, notably carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), ozone (O_3) and chloro-fluorocarbons (CFCs) are increasing. These gases are essentially transparent to incoming short-wave solar radiation but they absorb and emit longwave radiation and are thus able to influence the Earth's climate.
- The role of greenhouse gases other than CO_2 in changing the climate is already about as important as that of CO_2. If present trends continue, the combined concentrations of atmospheric CO_2 and other greenhouse gases would be radiatively equivalent to a doubling of CO_2 from pre-industrial levels possibly as early as the 2030's.
- The most advanced experiments with general circulation models of the climatic system show increases of the global mean equilibrium surface temperature for a doubling of the atmospheric CO_2 concentration, or equivalent, of between 1.5 and 4.5 °C. Because of the complexity of the climatic system and the imperfections of the models, particularly with respect to ocean-atmosphere interactions and clouds, values outside this range cannot be excluded. The realization of such changes will be slowed by the inertia of the oceans, the delay in reaching the mean equilibrium temperatures corresponding to doubled greenhouse gas concentrations is expected to be a matter of decades.
- While other factors such as aerosol concentrations, changes in solar energy input, and changes in vegetation may also influence climate, the green- house gases are likely to be the most important cause of climate change over the next century.
- Regional scale changes in climate have not yet been modelled with confidence, However, regional differences from the global averages show that warming may be greater in high latitudes during late autumn and winter than in the tropics, annual mean runoff may increase in high latitudes, and summer dryness may become more frequent over the continents at middle latitude in the Northern Hemisphere. In tropical regions, temperature increases are expected to be smaller than the average global rise, but the effects on ecosystems and humans could have far reaching consequences. Potential evapotranspiration probably will increase throughout the tropics whereas in moist tropical regions convective rainfall could increase.
- It is estimated on the basis of observed changes since the beginning of this century, that global warming of 1.5 °C to 4.5 °C would lead to a sea-level rise of 20140 centimeters. A sea-level rise in the upper portion of this range would have major direct effects on coastal areas and estuaries. A significant melting of the West Antarctic ice sheet leading to a much larger rise in sea level, although possible at some future date, is not expected during the next century.
- Based on analyses of observational data, the estimated increase in global mean temperature during the last one hundred years of between 0.3 and 0.7 °C is consistent with the projected temperature increase attributable to the observed increase in CO_2 and other greenhouse gases, although it cannot be ascribed in a scientifically rigorous manner to these factors alone.
- Based on evidence of effects of past climatic changes, there is little doubt that a future change in climate of the order of magnitude obtained from climate models for a doubling of the atmospheric CO_2 concentration would have profound effects on global ecosystems, agriculture, water re- sources and sea ice.

RECOMMENDED ACTIONS

1. Governments and regional inter-governmental organizations should take into account the results of this assessment (Villach 1985) in their policies on social and economic development, environmental programmes, and control of emissions of radiatively active gases.
2. Public information efforts should be increased by international agencies and governments on the issues of greenhouse gases, climate change and sea level, including wide distribution of the documents of this conference (WMO, 1986).
3. Major uncertainties remain in predictions of changes in global and regional precipitation and temperature patterns. Ecosystem responses are also imperfectly known. Nevertheless, the understanding of the greenhouse question is sufficiently developed that scientists and policy-makers should begin an active collaboration to explore the effectiveness of alternative policies and adjustments. Efforts should be made to design methods necessary for such collaboration.

    i. Governments and funding agencies should increase research support and focus efforts on crucial unsolved problems related to greenhouse gases and climate change. Priority should be given to national scientific programme initiatives such as (a) the World Climate Research Programme (WMO-ICSU), (b) present and proposed efforts on biogeochemical cycling and tropospheric chemistry in the framework of the Global Change Programme proposed by ICSU, (c) National Climatic Research Programmes. Special emphasis should be placed on improved modelling of the ocean, cloud-radiation interactions, and land surface processes.

    ii. Support for the analysis of policy and economic options should be increased by governments and funding agencies. In these assessments the widest possible range of social responses aimed at preventing or adapting to climate change should be identified, analyzed and evaluated. These assessments should be initiated immediately and should employ a variety of available methods. Some of these analyses should be undertaken in a regional contest to link available knowledge with economic decision-making and to characterize regional vulnerability and adaptability to climate change. Candidate regions may include the Amazon Basin, the Indian subcontinent, Europe and Arctic, the Zambezi Basin, and the North American Great Lakes.

4. Governments and funding institutions should strongly support the following:

    i. Long-term monitoring and interpretation with state-of-the-art models of:

        a. radiatively important atmospheric constituents in addition to CO_2, including aerosols,
        b. solar irradiance, and
        c. sea lever.

ii. Study and interpretation of the past history of climate and environment, specially regarding interactions among the atmosphere, oceans and ecosystems.
iii. Studies of the effects of atmospheric compostion and of changing climate and climatic extremes on sub-tropical and tropical ecosystems, boreal forests, and on water regimes.
iv. Investigations of the sensitivity of the global agricultural resource base with respect to:

   a. direct effects of increases in atmospheric CO_2 and other greenhouse gases,
   b. effects of changes in climate, and
   c. probable combinations of these.

v. Evaluation of social and economic impacts of sea-level rises.
vi. Analysis of policy-making procedures under the kinds of risks implied by a significant greenhouse warming.

5. UNEP, WMO and ICSU should establish a small task force on green- house gases, or take other measures, to:

   i. Help ensure that appropriate agencies and bodies follow up the recommendations of Villach 1985.
   ii. Ensure periodic assessments are undertaken of the state of scientific understanding and its practical implications.
   iii. Provide advice on further mechanisms and actions required at the national or international levels.
   iv. Encourge research in developing countries to improve energy efficiency and conservation.
   v. Initiate; if deemed necessary, consideration of a global convention.

REFERENCE

World Meteorological Organisation (WMO) (1986) *Report of the International Conference on the assessment of the role of carbon dioxide and of other greenhouse gases in climate variations and associated impacts,* Villach, Austria, 9-15 October 1985, WMO No.661.

Australian and New Zealand Environment and Conservation Council

Report of

PROGRAMS IMPLEMENTED AND POLICIES ADOPTED SINCE 1988 THAT CONTRIBUTE TO REDUCING GREENHOUSE GAS EMISSIONS IN AUSTRALIA

October 1991

FOREWORD

In September 1990 the Australian and New Zealand Environment and Conservation Council (ANZECC), *inter alia*, noted that the Intergovernmental Panel on Climate Change (IPCC), calculated with confidence that emissions of carbon dioxide from human activities would have to be reduced by 60 percent to stabilise its concentration and that other gases would need to be reduced by between 15% and 85%.

ANZECC further stated in *Towards a National Greenhouse Strategy for Australia* that its proposed Australian target of a 20% reduction in carbon dioxide emissions below 1988 levels by 2005 and stabilisation of emissions before that date, was achievable through the implementation of energy efficiency and renewable energy options and fuel substitutions. These measures were also considered to deliver other environmental and economic benefits. At the September 1990 meeting, ANZECC reaffirmed its adoption of its national planning target and strongly supported the need for a national strategy to reduce greenhouse gas emissions.

On 11 October 1990, the Commonwealth Government adopted an interim planning target of stabilising emissions of greenhouse gases (eg carbon dioxide, methane and nitrous oxide), not controlled by the *Montreal Protocol on Ozone Depleting Substances*, based on 1988 levels by the year 2000 and reducing these emissions by 20% by the year 2005. All State and Territory governments endorsed this decision at the October 1990 Special Premiers' Conference and agreed to cooperate in the development of the National Greenhouse Response Strategy.

ANZECC has prepared this paper on measures already underway to achieve a 20% reduction in greenhouse gas emissions. In recent times, efforts of the Commonwealth, State and Territory governments on the climate change issue have been concerned with the development of a policy framework for achieving reductions in greenhouse gases in national fora such as the Special Premiers' Conferences. ANZECC has also promoted at leading national fora the need for consideration of the development of national coordination during the implementation of greenhouse gas reduction initiatives and impacts response strategies, in the next phase of deliberations on this issue.

The following documentation provides information on those measures implemented or recently approved on a government by government basis, to reduce or restrict greenhouse gas emissions. Some of the measures arise from government programs with the primary purpose of reducing greenhouse gases, others do so as a by-product of other policy objectives.

Many of the measures focus on community and industry energy consumption practices and in particular efficiencies for the energy and transport sectors. These sectors are identified as major sources for greenhouse gases, particularly carbon dioxide.

For example, the State Energy Commission of Western Australia (SECWA) has developed programs to promote efficient energy use in the domestic, commercial and industrial sectors. These demand management programs include restructuring energy tariffs, education and a joint promotion (with industry) of energy efficient lighting. SECWA also operates Australia's only commercial wind farm at Esperance, and is looking to increase the contribution of renewable energy sources to the Western Australian energy grid.

Following the release of *The Greenhouse Challenge* statement in 1989, the Victorian government has implemented a range of measures designed to reduce greenhouse gas emissions: including, in 1990 the introduction of mandatory insulation controls in new housing and permanent controls on the clearing of native vegetation. The promotion of energy conservation and renewable energy is a high priority and accordingly, the Victorian government has adopted an interim policy to incorporate the costs of externalities in government planning by providing a 10% cost advantage to energy conservation and renewable energy resource options. Major demand management programs have been launched by the State Electricity Commission of Victoria (SECV) and Gas and Fuel Corporation of Victoria. The SECV is committing $55 million over three years to this program in addition to its existing Cogeneration and Renewables Incentives Program.

Transport efficiency programs to reduce greenhouse gas emissions have also been established as part of the South Australian Greenhouse Strategy. The South Australian programs aim to reduce emissions by motor vehicles through promoting, amongst other things, efficient driving techniques, applying restrictive speed limits, promoting alternative modes of transport, establishing greater vehicle occupancy rates and promoting more stringent fuel consumption targets. The Victorian and Western Australian governments have established similar initiatives. The Australian Capital Territory government is actively seeking to maximise the utilisation of public transport and encouraging the multiple use of cars by providing areas for free parking for vehicles

Rural industries: workshop on climate change

Canberra, 10 November 1989

BRR Report No. R/3/90

Table 5. SCENARIO, AUSTRALIA 2030 AD

This scenario was issued at the Planning Ministers' Greenhouse Seminar in Cairns, in June 1990, and was labelled:

"best state-of-the-science advice, June 1990"

NOTE: THIS IS NOT A FORECAST
use for sensitivity studies only

TEMP.	+1 or 2 °C in northern coastal areas +1 to 3 °C in southern coastal areas +2 to 4 °C inland More in dry season, less in wet
RAIN	+10 to 20% in summer rainfall region -10% in winter rainfall region (southwest) More intense rainfall events Monsoon more intense
EVAPORATION	5 to 15% increase
TROP. CYCLONES	Could form and move further south Some may be more intense Preferred paths may alter Frequency change - affected by ENSO
ENSO	Future behavior uncertain Probably El Ninos & anti-El Ninos will continue to occur, ie., drought and flood years
SNOW LINE	Up 100m per 1 °C
WINDS	Weaker trades Westerlies further south Strong squalls with severe weather events
EA LEVEL	Global average up about 20 cm by 2030 3 to 10 cm rise per decade Weather changes will affect magnitude & frequency of extreme events
XTREME EVENTS	Magnitude and frequency of extremes generally change more rapidly than the averages
RECT CO_2 FECTS	Generally beneficial to C_3 plants (eg. wheat) but not to C_4 plants (eg., sugar cane, sorghum)

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VEATS: These are generalised best estimates, relative to the 1980's, based on IPCC and CSIRO studies, and are of varying degrees of reliability. There will be important regional and local variations.

Early 1990 *Australian Financial Review* article demonstrating the good understanding of the climate change risk message, the political barriers and the neutral to critical approach to industry lobbies by the business press at this time.

AUSTRALIA'S GREENHOUSE DILEMMA DISREGARDED BY ELECTION CAMPAIGN

Michael Stutchbury
1169 words
7 March 1990
Australian Financial Review
16
English

KEEN to be green, Mr Hawke and Mr Peacock are falling over each other to prove their environmental credentials on issues dear to the hearts of swinging voters, such as mining in national parks, logging of native forests and pollution of beaches.

Typical of this election campaign, by far the biggest environmental issue confronting the world and Australia in the 1990s - the international response to the greenhouse effect of global temperature warming - has hardly rated a mention.

For the next Australian Government, the big environmental problem will not be global warming (which will come later to a highly uncertain extent), but the likely international agreements designed to reduce the emission of greenhouse gases produced by the combustion of fossil fuels.

A 20 per cent reduction in carbon dioxide emissions by the year 2005 is the benchmark set by the 1988 Toronto world conference on the changing atmosphere and which is being examined, with Australian bureaucratic input, by the Intergovernmental Panel on Climate Change.

As early as 1992, a global "carbon" tax, perhaps applying more heavily on"rich" nations such as Australia, is being taken seriously by officials in Canberra as one possible outcome of the international deal-making. Such a carbon tax would be designed to promote use of alternative energy sources and to provide funds to bribe developing countries into developing less polluting technologies.

Another possible outcome would see Australia forced to "buy" the right to burn fossil fuels in the form of internationally tradeable emissions permits.

Whatever the mechanism, an idea of the enormous economic and social implications for Australia is contained in the current projections of energy use. These suggest that

carbon dioxide emissions in Australia will increase by around 50 per cent by the year 2005, a long way from the mooted 20 per cent fall.

The reasons for Australia's awkward position on global preventative responses to the greenhouse effect are simple. Ours is a carbon intensive economy. We are the biggest exporters of coal in the world. Electricity generation has been growing by 6 per cent per annum over the past two decades, to account for 44 per cent of carbon dioxide emissions. Ninety-five per cent of electricity produced in Australia is generated by the burning of fossil fuels such as coal and gas.

Per capita, Australians are the fifth highest greenhouse polluters in the world behind the United States, East Germany, Canada and Czechoslovakia. Australians produce an annual average of four tonnes of carbon dioxide each, compared to the world average of around one tonne. We are the third highest per capita users of automotive fuel.

Moreover, to trade out of its foreign debt burden, Australia hopes to do much more processing of raw materials in the 1990s. Like the wave of aluminium smelting investment of the early 1980s, this would be energy intensive -and thus greenhouse intensive - stuff.

As the "world's greatest environment statement" issued by Mr Hawke last year put it: "We are likely to find it much more difficult to reduce carbon dioxide levels than some other countries. We may even need to increase the levels to accommodate growth of internationally competitive export industries."

Australia's position can be contrasted against that of Japan, which is exporting its greenhouse emissions by shifting its industrial base offshore.

Instead, Australia is aiming to plant one million trees to provide a bigger"carbon sink" to absorb carbon dioxide discharge from our industry and transport systems. At the IPCC, Australian officials are pushing the idea of targetting "net" carbon dioxide additions to the atmosphere.

Despite Mr Hawke's boast in the "great debate" that his Government is at the forefront of the international negotiations of greenhouse responses, it is clear that Australia has more of a vested interest to protect than in its leading role on combating ozone depletion, driftnet fishing and mining in the Antarctic.

Compared to the greenhouse, these were easy issues. Substitutes are becoming available for the ozone depleting chlorofluorocarbons or CFCs (which double as a greenhouse gas); Australia does not driftnet; and we don't mine the Antarctic.

In Canberra, the Treasury line reveals the extreme nervousness of the"econocrats" over greenhouse responses, such as carbon taxes, which would add to the cost structure of local industry.

The Treasury has urged a "cautious approach", suggesting that a tax on the burning of coal could simply drive energy intensive industries offshore and produce little or no reduction in global greenhouse emissions. It even suggests that subsidies to the "cleaner" natural gas could simply increase overall energy consumption.

The Federal Opposition, in contrast, has accused the Hawke Government of having "deliberately squibbed" on setting targets for reducing greenhouse emissions and rejected arguments against "unilateral" action. It has committed itself to a 10-20 per cent cut in non-CFC greenhouse emissions by the year 2000, to come from lower vehicle emissions, cleaner power stations and increased use of alternative energy sources.

How it will force business and households to achieve these targets is not clear, although it supports a tax system which "would reward all those individuals and companies who act with the greatest degree of environmental responsibility and which penalises those who do not".

But the feasibility of cutting greenhouse gases by 20 per cent or so within 15 years is subject to considerable debate and uncertainty. A study last year commissioned by coal miner CRA Ltd produced the pessimistic conclusion that it would require a 40 per cent real increase in electricity tariffs, a 25 per cent real increase in car prices to pay for fuel efficiency gadgets, and a 60-120 per cent real jump in petrol prices.

Not surprisingly, the study suggests that such OPEC-style increases in carbon-based energy prices will have dire economic effects: even lower real wages and the loss of $30 billion of economic output, equal to two years'growth in GDP.

At the other extreme, a study commissioned by Senator Richardson's Environment Department argued that potential energy saving efficiencies available from existing technology in road transport, energy and in the home were capable of meeting the Toronto emissions target with little economic pain.

But the magnitude of this task is highlighted by the fact that solar energy still only amounts to less than 0.1 per cent of energy consumption in Australia. The energy and greenhouse "intensity" of the Australian economy has actually increased in the past few years, with lower real oil prices encouraging bigger motor vehicle engines.

For the 1990s, one possibility is that the magnitude of getting global co-operation on greenhouse prevention from the industrialised and developing countries will prevent any effective international agreement.

If this is the case, then Australia and the world in the 20th century will practically test the claims of some economists that the costs of trying to prevent the greenhouse effect are likely to be less than the costs of adapting to a warmer global climate.

Document afnr000020011110dm37003ne

Mid 1990 article in the general interest *Sydney Morning Herald* cited in chapter 4 illustrating the frames and public knowledge at that time

IT'S THE END OF THE WORLD AS WE KNOW IT

PAUL CLEARY
1901 words
5 June 1990
Sydney Morning Herald
1
English

FORGET the big house, the central heating and the two- or three-car family. In the future Australians will be first encouraged and then coerced into becoming environmentally-conscious world citizens - all in the name of global survival.

If you think this sounds far fetched, think again. The greenhouse effect -the warming of the planet - means governments are taking seriously the warning of scientists that we have to act now to prevent the greatest environmental and economic disaster in the world's history.

A Hawke Government committee is already working on the re-education of the Australian community and effective measures that will result in fundamental changes to our lifestyles.

On a very basic level, this working party recommends a public education program which would encourage people to live in smaller houses, use electronic transactions rather than personal travel, switch to solar power, drive their cars less frequently and become accustomed to warmer/cooler indoor temperatures in summer/winter.

Our industries will face legislation aimed at reducing the emission of greenhouse gases. They will be forced to become more energy efficient.

Australia's economy is carbon intensive. Output of greenhouse gases in Australia is rising at a rate of about 2.4 per cent a year, almost double the world average, and its per capita output is among the highest. Between 1973 and 1986, energy consumption in Australia rose 34 per cent, compared with an International Energy Agency average of 7 per cent. The Federal Government has quite clearly embraced the concept of global warming and is keen to put in place a range of policies.

During the election campaign, the Government committed an additional $17 million over the next three years to research into the greenhouse effect.

The Prime Minister, Mr Hawke, said it was the "greatest global environmental concern".

The international work on the greenhouse is being done by the Intergovernmental Panel on Climate Change. Under the auspices of the United Nations and the World Meteorological Organisation, the IPCC has brought together more than 1,000

scientists from around the world who, over the past two years, have examined the likelihood of global warming, the likely impacts and a series of tough policies.

That work, which is expected to be made public in a few months, provides virtually irrefutable evidence on global warming. The debate now shifts to what can be done.

One of three IPCC papers examines options for stabilising greenhouse gases, which in effect means a 60 per cent cut in cumulative production between now and 2005.

The IPCC process will come to a head in November when all UN countries will attend the Second World Climate Conference. The Geneva conference is aimed at achieving international agreement on a world climate convention.

It is envisaged this will entail general undertakings on cutting greenhouse emissions. But this is leading up to a final conference planned for 1992 at which it is hoped that binding protocols on cutting greenhouse emissions will be signed.

There is little doubt that the cost of achieving such a target, both in terms of resources and standard of living, will be huge.

But, even if the greenhouse effect is proved to be the greatest beat-up by the scientific community this century, it can be argued that there is an opportunity to gain enormously. Governments will have been forced to make enormous efficiency gains that would otherwise have been inconceivable. And they will have increased the world's knowledge about climate systems by leaps and bounds.

The threat of global warming and the realisation that, perhaps, something should be done to curb output of carbon dioxide and other greenhouse gases was first raised by a conference in Toronto in 1988. It was agreed that significant global warming was a near certainty, and that a 20 per cent cut from 1988 levels should be adopted.

That conference coincided with a severe drought in North America, and it captured the world's imagination. Since then, it's been smooth sailing for scientists in putting the greenhouse high on the policy agenda.

Target reductions in emissions will be on the table at the November meeting and are being examined by Canberra officials working on Australia's response. A "carbon tax" on wealthy nations is being seriously examined by Canberra officials.

One of four papers presented to the Prime Minister's Science Council on the greenhouse says Australia should become a "fast follower" because of the opportunities for technological development and new industries. But that paper, by J.E. Kolm and Ian Walker, warns that substantial government intervention with deep reaching and pervasive effects will be needed.

Similarly, a report produced last year by coal miner CRA says cutting greenhouse gases by 20 per cent would involve a 40 per cent increase in power charges, a 25 per cent rise in car prices and a rise in petrol prices of up to 120 per cent.

Nevertheless, it is expected that Cabinet will agree to a position before the IPCC meeting.

Even the policy proposals slated for immediate implementation are in many ways quite profound.

The first responses should involve ironing out inefficiencies that have long been a way of life.

Most prominent are abolishing State government subsidies for power generation, which allow power authorities to operate at a low level of profitability, and to end cross-subsidisation of consumers by large companies. The NSW Government estimates such a change would involve increasing power charges for residents by 17 per cent, while making power authorities run profitably would involve increasing power costs by 5 per cent, according to the Industry Commission.

It says State electricity authorities should stop increasing capacity and instead focus on helping consumers use less power.

Australia annually produces about 260 million tonnes (Mt) of carbon dioxide(CO22), and its equivalents like methane and CFCs.

The report proposes detailed strategies for pruning back this output.

Residential power demand accounts for about 40Mt of CO22 a year. The government's working party, for example, proposes increased use of solar water heating would cut emissions by 8Mt a year, based on a reasonable penetration; improved energy efficiency of refrigerators and other domestic appliances would save about 7Mt a year based on a 20 per cent improvement in average performance, and use of natural gas for space heating and cooking would save about 3Mt. Refitting homes and redesigning new homes to be more energy efficient would save 3.5Mt a year, and this could be achieved in about 15 years.

Officials concede that these are "ball park" estimates. Nevertheless, the fact that these kinds of estimates have been produced show that a number of influential people are thinking very seriously about how each of us can cut back on energy consumption.

Energy intensive industries, such as aluminium, could save about 8.4Mt in the short run, which the report says is only a small amount because these industries are well aware of efficiencies. Low energy industries could save 7.7Mt a year.

Low energy industries can achieve most savings from, for example, redesigning new buildings and refitting existing ones which would save about 10Mt a year. The report talks about developing national building codes, and introducing "energy audits" of companies.

But the report concedes these policies will only bring about modest reductions in greenhouse gas emissions. To make real progress, this will involve "substantial outlays and perhaps major economic and social structural adjustments".

The report says that, although there is uncertainty about the threat, action should be taken now, just in case the scientists are dead right.

Long-range solutions for energy production centre on switching from coal to natural gas, or a combination of the two.

But these involve bringing forward the obsolescence of power plants worth billions of dollars, while huge investment in new natural gas pipelines would also be required.

Some of the options include: co-firing power stations with natural gas which would cut emissions by 10 per cent or 25Mt; building new power plants that use new techniques such as gasified coal (turning coal into gas); and pressurised fluidised bed combustion (burning coal under pressure) which would achieve savings of up to 25 per cent or 50Mt.

Energy intensive industries, such as aluminium, could cut their emissions of around 32Mt a year by a third by using a process of direct reduction rather than electrolysis.

Cutting emissions at source, like improving reticulation systems in town gas lines, would also require huge investment. However, the Australian Gas Company is investing $400 million in the Sydney reticulation which alone is justified on cost recovery.

Chlorofluorocarbon emissions account for 18 per cent of Australia's greenhouse gas emissions, and these are expected to be eliminated by 1995. Companies producing aerosols have replaced damaging CFCs with less harmful hydrocarbons.

The CSIRO's chief research scientist and assistant chief of the division of atmospheric research, Dr Graeme Pearman, is one of 12 Australian scientists working on the international project. He co-ordinates the CSIRO's climate change program.

The main finding from the scientific work is an even stronger likelihood of global warming.

The CSIRO has already developed a sizable research program on global climate change. It covers a series of divisions: atmospheric research, wildlife and ecology, water resources, environmental mechanics and plant industry, and oceanography.

According to Dr Pearman, the most recent research says that by 2020 the planet will warm by more than 1 degree celsius. By 2070, the average temperature of the plant will rise by about 3.5 degrees.

When international scientists first came together in 1985 to develop forecasts, they said the earth would warm by between 1.5 and 4.5 degrees in the next 30 to 50 years. (That meeting, of about 100 scientists in Villach, Austria, was the first time that broad consensus on global warming was achieved.)

The IPCC work shows that scientists have been able to be more precise about likely warming by narrowing their ranges on a global scale.

Rainfall is expected to rise by about 3 per cent by 2020, and be up to about 7 per cent by 2070. The sea level is expected to rise by between 10 and 30 centimetres by 2030, and by between 30 to 80 centimetres by 2070. The Villach conference was only able to establish a rise in the sea level of between 20 and 140 centimetres by 2030.

Dr Pearman concedes, however, that the rise in the Earth's average temperature this century of about half a degree Celsius is within the bounds of normal variations but that by 2030 greenhouse gases will have doubled.

"If you add those gases to any of the models, then what they do is attract more heat to the Earth's surface," he says.

He argues that the research is extremely useful for Australia because it helps us understand drought, flood and extreme precipitation.

Climate models suggest that Australia will become wetter, but this is very uncertain at a regional level. It is generally accepted that climatic zones will move towards the Antarctic.

CSIRO's research, however, has been focused on regional impacts in Australia and it is developing regional climate models in Melbourne on a super computer, called a Cray computer.

The models will attempt to describe, in detail, how patterns of rainfall and temperature variation will change.

Document smhh0000200111116dm6500eva

Mid 1996 article providing evidence of the changed political framing and also of the use of science context in a political story

Climate Changes: Why We Are Seen As Rebels
By GAVIN GILCHRIST Technology Writer
917 words
8 July 1996
Sydney Morning Herald
1
English

The latest effort to tackle global warming from the greenhouse effect begins in Geneva today. For the first time, Australia's pro-industry position will face international scrutiny. Today The Herald begins a two-part series, The Greenhouse Stand-Off, examining Australia's stance.

The Howard Government today steps up its diplomatic offensive opposing international efforts to protect the world's climate at the historic meeting of the Climate Change Convention in Geneva.

Australia, with its pro-industry stance, is set to be seen as a rebel nation out of step with mounting global concern about the threat of climate change from the greenhouse effect.

Today's conference, to be attended by the Federal Environment Minister, Senator Hill, will be the first time ministers from the world's governments have met to debate the alarming scientific verdict last December that global air pollution from burning oil, coal and gas, together with the impact of agriculture and clearing forests, has begun to shift the world's climate.

Since last century, global temperatures have climbed by up to 0.6 degrees Celsius. Rather than this being a natural phenomenon, the world's top climate scientists say, "the balance of evidence suggests" it is from the build-up of greenhouse gases trapping more heat around the planet.

While the finding has prompted many advanced nations to accelerate action plans to cut greenhouse gas emissions, the Howard Government has subtly but significantly shifted Australia's position in the opposite direction.

Federal Cabinet's decision on the greenhouse issue a month ago was a triumph of strategic long-term lobbying by the Business Council of Australia, which represents Australia's biggest 100 firms, and about 20 other industry associations.

More than five years of intensive lobbying behind the scenes in Canberra paid off spectacularly. A Herald investigation has revealed how the outcome was achieved:

* Key links into departments were cultivated through the strategic head-hunting of well-placed bureaucrats;

* A government economic study supporting industry's view was co-funded, then handed to diplomats to promote around world capitals;

* More recently, an intensive round of lobbying ministers and their new advisers was completed.

Industry's influence over the bureaucracy in Canberra was aided by a revolving door between the groups.

Prominent examples include: Mr Paul Barratt, the former head of the Business Council of Australia, who was recently appointed head of the Department of Primary Industries and Energy by the Howard Government; Mr Tony Beck, former senior economist in the research arm of that department, who now runs the greenhouse campaign for the Business Council; and Mr David Buckingham, the top lobbyist for the mining industry, who was recruited from the Department of the Environment.

Also, Mr David Coutts, chief lobbyist for the aluminium industry, a major contributor to greenhouse gases was, until two years ago, a senior official within the Department of Primary Industries and Energy.

In preparing for the Geneva climate conference, Cabinet accepted without reservation the industry's view that Australia - because of its big energy sector - deserved special treatment in any international action on climate change.

Critically, industry's position that developing nations should also be included in the convention negotiations was accepted by the Howard Government. Australian companies feared their expansion was going to be restricted while their competitors' in developing countries would not.

Environmental groups who had argued the scientific evidence demanded tougher action by Australia gained no concessions. It was winner take all.

"It was a victory for old-style resource-intensive development over the creative, technologically sophisticated firms of the future," said Dr Clive Hamilton, head of the Australia Institute, a Canberra think-tank. "The Howard Government made a big play about promoting small business but Cabinet's greenhouse decision was an emphatic victory for big business over small business."

A government official, who spoke on condition of anonymity, said: "The Australian position has changed from being a very wide one that recognised the science, the need to be putting new technologies into developing countries and giving them financial assistance, and that recognised the need for adaptation strategies but also included trade concerns.

"Now, instead of the holistic approach, we've zoomed in on the bottom line and trade is the only driving consideration."

Australia is the world's biggest coal exporter, a major natural gas exporter, and a major exporter of aluminium smelted using vast amounts of electricity from coal-fired power stations. That makes Australia one of the world's highest producers of greenhouse gases per capita.

Canberra insiders say the final position of the Howard Government on greenhouse shows that when lobbyists for vested interest groups succeed in winning over bureaucrats, they invariably win the policy debate.

"If a bureaucracy and a lobby group are as one mind, it's almost impossible for governments to receive alternative advice," said Mr Bob Gordon, managing director of Australian Business Links, a business consultancy which represents companies with renewable energy interests. "In which case, the interests of the public can be a major casualty."

The Geneva meeting is the first top-level conference of the Climate Change Convention since it was signed into force in Berlin last year.

Held at the historic Palais des Nations, it will be opened by the German Minister for the Environment and host of the Berlin meeting, Ms Angela Merkel.

Tomorrow Part 2: Europe and the US react to our stand in Geneva.

Document smhh000020011015ds7800gj3

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APPENDIX 2

Invitation to participate and consent form

Name of Project – PhD thesis:
Science interaction with climate change policy and public knowledge in Australia 1980s to 2001; Includes an exploration of the documentary record, the public discourse, cultural values and information framing that may have influenced the science communication.

Because of your knowledge or involvement with the project subject, you have been invited to participate in a study looking at the interaction between science, politics and media in the development of public policy and public discourse regarding climate change during the past 18-20 years and how this discourse developed and changed.

The purpose of the study is to provide insights for science communication into the cultural influences that affect how environmental science messages – in this case about climate change - are framed for public discussion and how they can be influenced. The study should further inform the history of climate policy in Australia, by examining the science communication pathways including barriers to effective or clear communication of the science – complementing earlier works that provide a political chronology and economic analysis of policy development and work on the influence of economic/business interest groups.

The study is being conducted by Ms Maria Taylor, PhD student at the Centre for the Public Awareness of Science in the College of Science, Australian National University.

If you decide to participate, you will be asked a range of questions in a loosely structured one-on-one interview with the researcher (Ms Taylor). The questions will cover your perceptions, recollections and other knowledge of the nature, policy influence and communication pathways and processes relating to climate science information, provided both to governments and to the general public, during the period in question. You may also be asked about your perceptions or interpretation of cultural beliefs and assumptions that may have influenced this communication process.

Interviews will be conducted on audiotape. Some information provided during interviews may be of a sensitive nature and the researcher undertakes not to attribute direct comments, quotes or paraphrase interview information in a manner that is easily attributable to you, without your written permission. Interview material will be stored in a locked filing cabinet and/or password-protected computer in the office of the researcher.

You may be asked whether you can supply supporting or related documents that can enhance the understanding of interview material. Some content of these documents may eventually be published with the research results.

However, any and all personal or identifying details will be removed by the researcher, unless you grant written permission for attribution.

These guidelines cover both the PhD thesis and any subsequent related work published by the researcher.

Alternately, you may give written permission, below, to participate 'on the record', which means your name may be used and interview or documentary information may be attributed to you in research and public forum publications subsequent to the thesis, if appropriate.

If you decide to participate in the research, you are free to withdraw at any time without providing a reason and without consequences.

Consent to participate in the project, please respond and sign the following section:

I do/do not ***(please circle one)*** agree to speak 'on the record' and allow the researcher to publish my name and attribute to me interview information or supporting documents. This can occur in research reports or public forum publications, as appropriate. I understand that the researcher will notify me and discuss any identifiable material prior to publication, and that I can withdraw my consent to 'speak on the record' at any time without consequences.

(Your name) I.....have read and understand the information above. My questions were answered to my satisfaction. I agree to participate in this research, knowing that I can withdraw from further participation at any time without consequence

I have been given a copy of this form to keep.

Participant's **signature**.....Date.....

Researcher's Name...Maria Taylor.....
(Block Letters)

Researcher's signature.....Date.....

The ethical aspects of this study have been approved by the ANU Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of this research, you may contact the researcher's PhD supervisor (Dr Susan Stocklmayer, phone 02 6125 8157) or the Committee through its Secretary, phone 02 6125 2900) or by email: Human.Ethics.Officer@anu.edu.au). Any complaint that you make will be treated in confidence and investigated, and you will be informed of the outcome.

Interview Transcript – Maria Taylor (MT) & John Kerin (JK)
23/1/2008

MT Do you mind if I tape this?
JK – (indicates he doesn't mind)
MT – As Minister for Energy you signed the October 1990 policy on an Australian emission reduction target, which is actually how I recognised your involvement there, do you recall much of that?
JK – No
(MT and JK laughter)
JK – so much was happening; when was the climate change conference in Rio?
MT – 1992; this was earlier, so in the late '80s, (87-91), when you were the minister for (industry and) energy, climate change was very much on the agenda in Australia as a burgeoning issue. Do you recall anything from that time?
JK –Well, I recall the debate was about climate change and from the agricultural perspective and the advisors in that department - even when we took on resources and energy, as well – were very much of reduction economic trade mindset. So, it was all adaptation to climate change rather than any real emphasis on implications of global warming. All of this is as I recall, I'd have to go into boxes full of stuff...
MT – What was portrayed in the newspapers was very much mitigation, like, 'we have to do something' and Hawke's policy at that time (1990) was billed as the 'world's greatest environment policy'.
JK – That was when Peter Cook and I got the money for Landcare because Landcare at the Commonwealth level was formulated in my office and in the department when I was minister for Primary Industry and then Primary Industry and Energy. The people in the department were John Kerr, a fellow called Terry Smart, and in my office was Tony Gleeson, John Tanser and Jeff Gilmore. I got the super ministry the first minister with me was Peter Morris and he came from transport and was somewhat aggrieved as he'd been on equal footing with me and... it was a bad arrangement. Then Peter Cook became Minister for Resources and I gave Peter all this work we were doing and it was his stroke of genius to give it to Toyne and Farley and it was he that also spoke with Heather Mitchell and Joan Kerner in Victoria and that's where the name 'Landcare' came from. It was created in that State. I vividly recall this, Peter came back to me and said 'they want the lot!' because it was just a great big body of work. What I was concerned with was that foresters thought the next hill was theirs and fisherman thought they could go out a bit further to sea, the fish were there, so it was access to public resources, y'know? But we were sitting there like two big brown hungry dogs. When Hawke decided he was going to have the world's greatest environment statement, that's how we got the money for it. But, most of the memories that come back to me are from the economic heavies and the producer minded people in Resources and Energy saying, adaptation. I think we were pushing for mitigation but we didn't use that word, we probably used amelioration and I don't think we understood at all the full implications of global warming. We shouldn't be using 'climate change' as a phrase in my opinion, it should be 'global warming' because we've always had climate change. This is the most variable climate in the world. Australian agriculture is subject to, one study I saw, 220% higher level of climate change, climate variability than any other developed agriculture producing nation.
MT – In terms of language, in those days it was referred to as 'The Greenhouse Effect' and it seemed to be well understood. It was a source of pollution, it was described in those terms... people weren't seeming to have much trouble with

that concept. All the States and Territories at that time developed a strategy to ameliorate, or whatever you called it.

JK – It was all a bit like ESD. I was sort of responsible for getting the ESD program up and running, and the Resource Assessment Commission, trying to get some facts out in a very heightened debate which was mainly about trees in the late '80s. I guess out of that process came the phrase ESD, the acronym, and I was, to my discredit, somewhat cynical of the States because they were putting ESD into every Act and Legislation and I felt roughly the same way about States having those sorts of strategies so all these things doesn't depend on the words it depends on the will. Carr, Bob Carr, now is just brilliant on climate change and global warming. So it depends on various individuals.

I went to Rio and Ros Kelly was the person there, I was only sent to try to put one sentence in her speech. She promised she would but she didn't subsequently put it in... She played it for the audience back home which was smart politics, we didn't articulate a position there. So this again reinforces the view that we're all into a bit of lip service. And I must say, to my discredit, I just was too bound up in thinking that agriculture could adapt. When Alan Griffiths came along as my Minister of Resources I recall, and he had John Brumby with him as head of his Chief of Staff, I recall saying to him 'there have got to be hundreds of ways of attacking this issue so, for God's sake, do something about local government and design and buildings and power saving. I don't think I said friendly light bulbs or anything but I was always taken by the fact these great big tall building in Sydney with glass, they're great heat banks – you can actually use them. I know it costs a bit more and there's a few buildings around but you really do save energy. But I don't think he got anywhere because a lot of this area was in State hands and you know how hard it is to get this Federation to work.

MT – It's true. I mean, certainly the states were talking along similar lines. Firstly the thing I wanted to ask you about trees and Landcare, was there some sort of link? An intellectual link between growing more trees and climate change? The one billion tree program, was that somehow...?

JK – Yeah, well they were greenhouse gas friendly. But then again I didn't understand all the science of it because it's subsequently been proved just planting trees doesn't do much and old forests don't produce as much as new forests and the older the forest is... y'know there's so many aspects of it and different tree forest types do produce more or less. A lot of people have (since) done a heck of a lot of research. There wasn't anywhere near the amount of information then that there is now.

MT – Do you remember greenhouse '87-'88, those first greenhouse conferences? Just as a citizen even? I'm just wondering if they were high on the radar screen.

JK – I'd seen papers, but you get 20 reports a day when you're minister. And there's always some hot topic that takes all your damn time.

MT – To what extent do you reckon the shift away from interest in this topic was really a matter of personalities, if you like, away from Hawke and Keating in terms of their own interest in environmental issues or thinking that the electorate cared about it?

JK – I don't know. The Prime Minister's job is to keep his mob elected, I guess. I had very little time for Hawke before I got into his ministry and then cabinet. But he looked after me very well and I grew to have enormous respect for him and on agricultural matters. I felt his awareness of environmental matters was real and deep. I never had that feeling with Keating in as much as I felt he was the one who sabotaged

the ESD project and Resource Assessment Commission. I can't swear to that, I know PM and C was a bit sick of it. I felt there was a lot more we could have done there. Personalities do count. Richardson was interested in votes, it's very hard for a Prime Minister or political party to resist the man that's more into votes than being into policy. I don't think Richardson was any kind of driver, I never got to talk with him much. I talked with Simon Balderstone and some of the people in his office; Tony Fleming and one woman there whose name I forget. They were pretty good people. Ah yes, her name was Judy. I thought she had the sense of humour of a hub-cap but she was a very nice person.

MT –I knew all these people. This was the interesting thing about, I guess, memory...

**** Chit-Chat****

JK – There's quite a few people who think I'm the devil-incarnate because of the brawls Richo and I are having in some areas. Because Richardson so happily endorsed everything that the people who seemed to think that policy is sold by bumper stickers. I always see policy and policy prescriptions and policy formation as pretty complex because it's got to be implemented.

MT – But... I think this is pretty interesting. It raises the question of leadership too because if I go back over newspaper archives, Richardson gave some pretty passionate interviews where he said all the right things. He said 'this is not a short range issue, this is the big issue of our generation and the next'. He certainly sounded like he understood the implications, so he was providing leadership by talking like that.

JK – Well, I didn't know that. Maybe we're all in our bunkers a bit too much. It was very different dealing with Richardson than it was dealing with Barry Cohen, who I could talk to, and Ros Kelly who was interested in ...she realised she couldn't keep on the Richardson agenda and got more into brown issues. I would have expected her to pick up more on this sort of thing.

****Chit-Chat****

MT – Getting back to Keating. It has raised an important issue to me in terms of what happens to policy because it was said about him that his style was quite different to Hawke's. Hawke came out of the 'accord' and was really consensual and believed in getting everyone around the table. Whereas Keating was much more bureaucratic.

JK –Keating sort of doesn't read. I guess tertiary education would have ruined him. These are very, sort of, subjective views. And I do think he's not very physically strong. Now, I know the good side of Keating and all the rest of that, how as a young person he'd identified new issues such as: republic, aboriginal conditions, these sorts of things. But Hawke was strong and intellectually strong and really, I just think in politics you have to be very physically and mentally strong. I never saw Keating in that context. I wasn't in his cabinet because I had Trade and Overseas Development then and certainly as Minister for Trade I was pushing climate change, global warming things. I ceased being Primary Industry and Resources and Energy Minister in 1991 and then start of '92 I was Trade and Overseas Development and that was a time when I started talking to other countries about this. And that was always pretty high on the agenda in briefings from that period on.

MT – Getting back to what you said about Keating not being physically strong. What you mean is that... what does that imply?

JK – He put so much effort into Question Time, which used to excite the press and the back bench, but he was emotionally, physically and mentally drained by each

weekend. I don't think he had the capacity to read and absorb the amount of material that Hawke did. He depended very heavily on the people around him and he could just so pick up words and synthesise them into short political messages. That was his enormous skill; I could never do this.

MT – And to what extent do you think the economic rationalists/fundamentalists of that breed were getting to him at that time?

JK – Keating was just like Costello; both of these people were suckers for treasury dogma. And I'm not saying treasury dogma is wrong, but it needs to be qualified. In the area I was dealing with it was applied micro economics and agriculture science. Macro economics, I have great difficulty in macro economics. It's not that I don't understand it is powerfully intellectual but it is prone to bandwagon effects and urges. The herd instinct: 'The market, the market, the market!'. In my terms they never examined enough market structure, market power, market failure. Power structure behaviour and the prospect of failure and anyone that believes in anything absolutely gets in all sorts of trouble because governments can't control everything, a small economy like Australia. There are examples in history where the whole neo-liberal Marshalian (Alfred Marshal, one of the great economists) consensus was resisted by all the universities in the United States during the depression. So I've always been worried about this adherence to macro economics, knowing you can't ignore macroeconomic indicators, knowing that it's powerful intellectually. So, I just disagreed with some of the treasury minds. Someone such as Keating, without any economic or tertiary training, and someone such as Costello being from a legal background, it doesn't matter how innately intelligent they are they become suckers for all the levels and sophistication of economic analysis and dialogue. This is just an intellectual fact.

MT – *Paraphrased* It's an intellectual thought to say that all these are just constructs and assumptions. It's been likened to a religion because it's belief based.

JK – Then there's the business paradigm and politicians using and abusing economics. No one was querying junk bonds in the '80s. Now it's derivatives and hedge funds all this sort of nonsense. The business community agreed will always carry them away. And you'll have the economists sort of either not looking at it and people saying the fundamentals don't count. The worst thing Keating ever did, he managed the economy by pulling leavers. Well do you think we were responsible for or could control the Chinese and Indian economies and their economic reform? Do you think we can control Bush's mad fiscal policies? Do you think we could have done anything about the sub-prime mortgage market in America?

MT- That's the market.

JK – It's a speculating market and greed always beats 'the facts'.

MT – What about Keating and the sense that, what I was told, under his government things like ESD and any greenhouse strategies got dissipated in about 30 different departments or committees?

JK – I don't know, I was out of the country for 149 days in 1992. Once you're out of cabinet and once you're in a portfolio like that y'know... though as I said, always in the briefing was climate change. I remember going to India and people telling me 'you seem very aware of this' and all the rest of it and I was looking out the window at these small little brick kilns just pouring out really dense black smoke.

MT – So it was on the agenda?

JK – Oh, yeah. It was on the agenda in all the countries I went to and the Pacific countries, even then, were worried about sea levels rising.

MT – So what happened to the department? I understand later on it was Trade and Industry that really became the blockers? Was it purely ideology?
JK – I don't know. I just don't know. Well... yeah I guess all the time. I mean we really are a producer economy, we really do go for the production first paradigm, don't we. Departmental advice is always conservative in as much as it is generally careful. One of the things that has always worried me about economics and science, and I set up the bureau of rural sciences in my department, because all they were concerned about was trade and economics. Economists are always absolutely sure they are right. Even when they're subsequently proved wrong they just forget about that. Scientists are never absolutely sure they're right because they always know there's more discovery and we learn more and more. We're just learning now about the role of predators in fisheries – no one ever told me about predators in fisheries and how the food chain works. And the Barrier Reef's health, for example, is dependent on not taking out too many of the predators. That's just an example.
MT – That's a very good point, it's another light on the whole issue of the world view of the different disciplines. Different scientists, but also then compared to economists and their view of the world.
JK – Well all of the agriculture and producing industries are mounted on the basis of scientific physical engineering research. Then economists come along and talk about the optimal allocation of resources within the industry, from a technical point of view, but welfare value distribution, equity, all of these things generally tend not to be addressed as thoroughly.
MT – Also as new politicians succeed each other, new people come in, strictly ideological people may rise to the top
JK – There are some ideologues in treasury, because I eventually became Treasurer and a few I just couldn't comprehend because they were always working on outdated statistics and on theory, to some extent. Some of the real heavies. I tended to rely more on Bernie Fraser and the Reserve Bank because they were actually dealing in a market and they were actually dealing with people taking decisions every day. That was far better than working on outdated statistics, which always needed correction, and theory.
MT – You put your finger on something there... the theorist versus the real world practitioners. In a lot of cases some of the Treasury people or the departmental people were said to be more hardcore/inflexible in these economic analysis than the business people were.
JK – Well I think you need someone like that and the Department of Finance are there for that. Dept of Finance are the accounts and Treasury is there for the management of the whole economy and you probably need people like the Church of Rome but it's up to a cabinet to really decide on the basis of a lot of thought how far you'd go with dogma. And that's my position.
MT – So then when you come up with a person like Howard who totally agrees with the dogma then it's all...
JK – But it's all small business dogma. Don't get me on Howard... I loathe the little sod. Howard's just like Richardson: Whatever it takes. He's left us with a terrible legacy.
****Chit-Chat****
MT – One last question. You said something in our phone chat about 'such a poisonous environment between the Environment and Industry portfolio'. Stalemated action I guess...

JK – Yeah, it was pretty bad. It was just so much political cause. I thought Dr. Bob Brown was a pathological liar with a messiah complex but I now tend to agree a lot more with what he says. But, in the early days in the Tasmanian forestry debate; A- the environment movement told lies; B- they really didn't know what they had or what was there. This was eventually confessed to me by a fellow named Keith Tarlow. So some was ignorance and some was just the undergraduate campaign and you can't blame Graham Richardson for giving them wins or them for taking wins on some of these issues. But, if science has convinced me something is rare and endangered well, the debate is over.

MT – So who was setting you straight on these issues?

JK – Getting other advice. The Australian Heritage Commission eventually did a lot of work. I've got the reports somewhere. And I used Henry Nix on the South-East forest just to get the facts out because ... The unions were telling me what terrible things the forest big five concession holders were doing and they were putting absolutely first-class logs into chippers for print. There was so much left on the ground, the forestry practices were truly terrible and all the rest of that, so I knew things were pretty bad. But just the grind of having to deal with it all the time! I had to stand over the Tasmanian Government and then you get down to Florentine sticks, Farmhouse Creek down there where I drew lines and buffers. Then they said 'we want buffers on buffers', then you negotiate that, then you find the ACF (*Australian Conservation Foundation*) agrees with a position (they're mainstream and more conservative) and the Wilderness Society had another proposition... so the grind of it really poisons the atmosphere between industry and you get to a position where you can't get a bottom line. It grinds you down because you don't have time when other things are happening: I had a farm crisis, wool, dairy industry... You name it - they're all happening at once.

MT – Actually that's a very good perspective... one of the things I was observing looking back was the environment movement during Hawke time and the ESD time were considered mainstream and therefore they probably had a fair bit of influence.

JK – I was the cabinet redneck, yeah.

MT – As time went by they became more and more marginalised.

JK – Probably because people realised they'd been fibbing. Walshie and all the really hard men, particularly Peter Walsh, accused me all the time of being absolutely too soft on the Greenies. To this day he really wacks into me every time he sees me. Because really, I'd been in environmental organisations since the mid-'60s.

MT – So you were a conservationist of the traditional school, if you like.

JK – I only used the word conservation. I'd never heard of land degradation I'd heard of soil conservation, y'know. But I observed what happened on the farm, I left school and swung an axe and pushed a hargan saw and I realised what would happen through fires and what would happen when the bush was cleared and how resilient dry sclerophyll forest was and I realised there's different forest types. Even though I had very little education.